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FINITE AND INFINITE

THOMAS CURRAN RYAN

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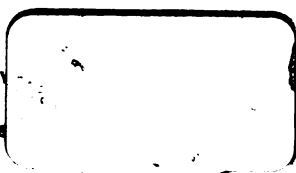
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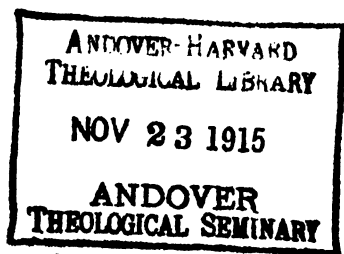
BY
THOMAS CURRAN RYAN
OF THE WISCONSIN BAR

“And ye shall seek me, and find me, when ye shall
search for me with all your heart.”—*Jer.* xxix. 13



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PREFACE



OUR Heavenly Father has endowed us with the powers of observing, thinking, and reasoning. Therefore we owe Him the duty to discern and think as well as we are able, and to teach with such clearness as is given us; holding to what appears as Truth, with such firmness and such humility that conscience and judgment shall always be in accord with word and deed, and preserving such unfailing trust in His wisdom and love that we shall never be dismayed because what seems folly to-day was thought to be science yesterday. In the search for truth, error detected becomes the lamp of experience, folly an honest effort to obtain wisdom. To know the *one* truth is well, but is not the highest moral

flight. We must also know the many things that are false or only in part true ; for to know them is wisdom, and having wisdom we shall the more readily find other truth. Thus truth and wisdom wax stronger, subsisting upon each other, and the moral nature of man is subjected to the divine method of evolution.

T. C. R.

WAUSAU, WISCONSIN,
October, 1905.

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PART I

ACTUS DEI

“Every good gift and every perfect gift is from above, and cometh down from the Father of lights, with whom is no variableness, neither shadow of turning.”—*James* i. 17

CHAPTER I

INTRODUCTION

DESTINY is evolution ; evolution is trend ; trend is infinite. Destiny comprehends an infinite number of finite conditions ; it is the new ever replacing the old ; it was, it is, it is to be ; it came ages ago ; it comes to-day ; it is in the future,—waiting. Every mile-stone on the endless thoroughfare of Time is Destiny. Do these mile-stones belong to Man ? Or is he only one of them ? We cannot answer apart from God. No general system of philosophy has been deemed complete that did not seek after a First Cause. Hence it is that all great philosophers have given to the world their ideas of God, or of something they chose to put in His place.

The effect cannot antedate the cause.

Therefore, as destiny is limitless its cause can have neither end nor beginning. The conditions of to-day, having been caused by those of the past, are themselves to be the causes of future conditions. There was no initial time, no beginning of destiny, no first cause; for these expressions imply limits,—finites; but cause, time, destiny, are among the eternal. This little word “first” has sometimes led science and philosophy upon a search for the beginnings of things eternal, the causes of things that were not caused but are self-existent. There is no first cause, but there is an Eternal Cause; all other causes are secondary. As infinites cannot be caused, the Eternal produces only finites,—forms. These are subject to the laws of evolution. Evolution, therefore, comprehends the destiny of all things which God has caused,—it is the divine method. Man is interested in

evolution because it is a revelation of God's methods and purposes. The more man is intellectually trained and morally enlightened the less is his satisfaction with existing knowledge concerning the Creator. He wants to know *more*,—all that possibly can be learned concerning God. He hopes to obtain from that knowledge inference of God's purpose concerning the human race.

From year to year, the tree of knowledge of good and evil, nurtured in the hopes and fears, the smiles and tears, of Humanity, bears better harvest. Behold, afar, the faint but sure promise of a day when its richest fruit, evolved in the heart-travail and soul-struggle of the ages, will be gathered :—a theology that shall be an all-inclusive philosophy,—a philosophy embracing God and all evidences of what He has done, is doing, and intends to do, with His creation, and for His creatures,—a theology that

will convince the intellect, thereby awakening to full fruition in the spirit of man the divine seeds of faith, hope, and love.

Thus our minds go out into the future,—the far future, it may be. Yet we are advised by some well-meaning souls that, as we can live only in the present, our best preparation for the future is to devote ourselves solely to present duties, “leaving the future to care for itself until we reach it.” These good people believe themselves intensely practical, yet their advice is of a sort that will bring certain failure to any business man who follows it.

The future must be considered in all that goes to make up earthly life. We take food to satisfy present craving and to preserve ourselves for coming tasks. We care for the child that it may be happy day by day and live to a vigorous and useful manhood. We educate our youths to prepare them for a future

which ignorance might find unsolvable. It is only by knowing what may reasonably be expected from to-morrow that we are able to discern our whole duty for to-day.

No argument is to be made here, save incidentally, in support of belief that God exists. Such an argument I hope to present in another book. My purpose now, is to consider, first, such evidences of God's disposition toward the world, as may be found in the history of nature ; and, second, as to whether, in the light of science and philosophy, we may conceive of Him as other than a Person, having such attributes as are, to human understanding, inseparable from personality. Is God a comprehensible and *real* friend who has imparted to human nature His own standard of right and wrong? Or is He an inconceivable, unapproachable, unknowable something, of infinite spacial extent and therefore

necessarily formless,—the cause of things that *we* call Evil and Good, Right and Wrong, which, judged by His standard, may be neither, but something not given us to know?

Such an inquiry, not based upon divine revelation, does not belong to theology in the commonly accepted sense of that word. It pertains, rather, to philosophy. Let us then prepare for it by an acquaintance with some basal principles of philosophy which should govern the method, and mental attitude, of all searchers for truth. This preliminary study will occupy the next four chapters.

CHAPTER II

TRUTH AND KNOWLEDGE

PHILOSOPHY has expended much wordy war upon the questions, What is Truth? What is the test of Truth? The centre of this battle-field in modern times seems to have been the inquiry, Is there or can there be any conscious truth dissociated from experience? Truth may exist without knowledge, but knowledge cannot be separated from truth. We cannot know what is untrue, and we know only a part of what is true.

Human life and its environments and limitations are such that the sort of knowledge discussed by philosophers is often lacking when one is required to act. In these cases we are compelled to act with only the lamp of probability to guide our footsteps. Thus acting, we

acquire further knowledge. We do not seem, however, to be nearing any goal. The search after knowledge does not present to our minds any promise of complete achievement. On the contrary, it impresses us, more and more, as being a process which must go on forever, as new questions, before unsuspected, are thrust upon us. An illustration of this is the fact that just now science is beginning to concede the necessity of investigating matters occurring, or said to be occurring, in the field known as "Psychic phenomena;" though it was only a very short time ago that a suggestion of such investigation coming from scientists of repute, such as Crookes and Zöllner, and some others, was received with derision. Thus as we journey on in our search for truth and knowledge an ever-widening vista in the infinite realm of the Unknown opens before us. And this is the means whereby Intellect is

subjected to the universal law of evolution.

The battle between Hume and Kant seems like many of the contests fought over doctrinal questions in the religious world. Hume insisted that the only way of reaching truth is through uniformity of experience. Kant alleged that no amount of experience can justly be termed uniform, since there is an eternity before us during which exceptions may arise,—that uniformity up to the present time does not make it a “necessary” or “absolute” truth, but only a “contingent” truth,—a truth upon probation, as it were,—a probation which, however, cannot culminate in proof. Kant had his own test of truth, which was to inquire whether its negation is conceivable. For example, I assert that I exist; can my mind conceive a negation,—that I do not exist? I assert that two straight lines cannot enclose a space; can my mind

conceive that two straight lines may enclose a space? In each case, negation being inconceivable, the assertion becomes a "necessary" or "absolute" truth.

I do not like the idea of coupling adjectives with truth. It does not appear to be an accurate mode of expressing what is meant, for it is not supposable that there are really different sorts of truth, and what is meant is only the attitude of our mind toward the evidences presented, or found, and appearing relevant to the question whether a statement or proposition is or is not the truth. We know that the answer of Truth lies beyond every inquiry. But how will it answer? If it be a question that can be answered "yes" or "no," which of these answers will Truth make? If it be Kant's question, "Can two straight lines enclose a space?" the answer of Truth is instantaneous,—

"No." Why this instantaneous answer? "Experience," replies Hume; "Negation is inconceivable," says Kant.

But suppose we ask a question to which there is no such obvious answer: suppose we ask, "What is the sky?" Can we conceive that there is no answer? No. We know, as well as we know there is a sun, that there is a something which we call sky, and so we can no more conceive that this thing does not exist than we can conceive the possibility of there being no answer to the question, What is it? But how is Truth going to answer this question? In this case, as in a great many others, like the indicted Irishman when asked by the judge, "Are you guilty or not guilty?" we must wait until we hear the evidence. But shall we *know* then? Possibly, but more likely all we shall know will be that if Truth made answer, the answer would quite probably be thus,

or so. And we should have a "contingent" truth. Now why call this any sort of truth? Why not say it is a hypothesis that has a greater or less appearance of truth? Truth is one of those exact things which can never assume but one shape. To call it contingent is to compound two incongruous ideas into one which means neither truth nor anything else.

John Fiske, after reviewing the arguments of Hume and Kant, and finding neither of them satisfactory nor complete, joined both together in one universal canon of truth, as follows:—

"A necessary truth is one that is expressed in a proposition of which the negation is inconceivable, after all disturbing conditions have been eliminated.

"A proposition of which the negation is inconceivable is necessarily true in relation to human intelligence.

"This test of inconceivability is the only ulti-

mate test of truth which philosophy can accept as valid.

“Thus the uniformity-test of Hume and the inconceivability-test of Kant are fused together in a deeper synthesis,—the deepest which philosophy can reach. As Mr. Spencer forcibly states it: ‘Conceding the entire truth of the position that, during any phase of human progress, the ability or inability to form a specific conception wholly depends on the experience men have had; and that, by a widening of their experiences, they may by-and-by be enabled to conceive things before inconceivable to them; it may still be argued, that as at any time the best warrant men can have for a belief is the perfect agreement of all pre-existing experience in support of it, it follows that, at any time, the inconceivableness of its negation is the deepest test any belief admits of. Objective facts are ever impressing themselves upon us; our experience is a register of these objective facts; and the inconceivableness of a thing implies that it is wholly at variance with the register. Even were this all, it is not clear how, if every truth is primarily inductive, any better test of truth could exist. But it must be remembered, that whilst many of these

facts impressing themselves upon us are occasional; whilst others again are very general; some are universal, and are unchanging. These universal and unchanging facts are, by the hypothesis, certain to establish beliefs of which the negations are inconceivable.'''

From this it will be seen that Hume, Spencer, and Fiske do not disagree with Kant as to the existence of truth which is "self-evident." They differ merely as to the causes which induce this mental attitude toward that class of truths.

Philosophy, in so far as it attempts to deal with the human mind, is handicapped very much as astronomy was before the invention of the telescope, the camera, and the spectroscope. It has only been able to examine those mental processes which are so very slow that they give plenty of time for observation. It has been forced to recognize the fact of a subconscious condition of mind which acts with inconceivable rapid-

ity, dreaming in an instant such a host of events as would occupy a week of normal thinking. We do not know but that all this truth which we call "self-evident" may come to our objective consciousness through this subconscious mill. Probably we shall never find out in the present life the secrets of this class of mental phenomena. We may find out more or less *about* them, but when it comes to finding *them*, laboratories are useless. The tangible cannot measure the intangible.

CHAPTER III

THE ABSOLUTE PERSISTENCE OF TRUTH

"ABSOLUTE" or "necessary" truths, says Fiske, "can be recognized by a simple act of consciousness, as self-evident." And for this very reason they are not susceptible of demonstration or proof. "You believe in your own existence, of which, however, you can furnish no logical demonstration, simply because it is an ultimate fact in your consciousness which underlies and precedes all demonstration." When Fiske follows up this with the statement that, if asked why we believe two straight lines cannot enclose a space, we can only reply that we believe it simply because we *must* believe it, perhaps a trivial issue might be joined with him. I am, myself, conscious of a momentary

process of reasoning when answering this class of questions; while, when answering such questions as, Do I exist? Is something nothing? Is there space? Is there time? Is the beginning before the end? Is there a boundary to space, or an end to time? Is design the same as chance? Are there such things as motion, heat, light, matter, mind, life? and thousands or tens of thousands of similar questions that might be asked, I am conscious of no mental process or act whatever, save the mere fact that I already possess the answer of Truth. In other words, I am conscious that I am conscious, and that is all.

Nevertheless, whether we become conscious of the truth through demonstration, or have it already in our consciousness, as one of those truths too self-evident to admit of demonstration, we are not conscious that these are different sorts or degrees of truth. The result

of demonstration and the *ipse dixit* of consciousness are equally truth to us, and we are as ready to swear by one as the other. Having pictured to ourselves the two straight lines, and satisfied ourselves that their shape is such that we cannot enclose a space with them, unless we destroy our proposition by changing the shape of one or both lines, we are as fully convinced that it cannot be done as we are of our own existence. So with more elaborate demonstrations. When truth is demonstrated, whether by the elimination of one, two, or twenty inconceivable propositions running counter to the successive steps by which the demonstration is reached, the converse of the result attained is found to be absolutely inconceivable, and we know that Truth has made its answer,—not “relative” truth, not even “absolute” truth, but simply truth. Anything short of this may cause in our minds the attitude of

belief. It points, maybe, to the truth, in which case it may lead us to the truth. It points, maybe, to error, in which case its believers will sooner or later find themselves upon the wrong path, and abandon it.

Let the foundation of inconceivability be named experience, or intuition, or what you will; the *fact* of inconceivability is the all-important thing. It is, of course, true that "by a widening of their experience men may by-and-by be enabled to conceive things before inconceivable to them," as Spencer says. That statement may be made even stronger and be within the truth, for this may not only be so "by-and-by," but it is so now, inasmuch as men with wide experience are able to conceive things inconceivable to others who have had little experience. Nevertheless, this is also true,—that when it comes to conceiving the possibility of an absurdity

involving the mixing of incongruous ideas, such as that nothing can be changed into something, or something into nothing, ability to form this class of conceptions is measured, not by that strengthening of mentality which comes from a "widening of experience," but by that childish credulity which is the companion of ignorance. It is true that learned men have for ages accepted without question beliefs now inconceivable to learned men,—such as that matter is destructible,—can be changed to nothing, and its corollary,—that it might be made from nothing, which Fiske likens to "framing in thought an equation between something and nothing." Such vagaries are not to be dignified by the title of thoughts, or conceptions; they are mere assertions uttered by the mouth, and disregarded by the mind. There have been always people ready to take their beliefs second-hand,

as children do, and to resent assault upon such fancied beliefs as heartily as if they were real. Fiske well says:

“The assent of philosophers in past ages, or of uneducated people in our own age, to sundry unthinkable propositions, is not to be cited as evidence that there are minds which can think what is unthinkable. The building up of enormous theories out of purely verbal propositions, which do not correspond to any thinkable concatenation of conceptions, has always been the besetting sin of human philosophizing.”

While I do not like the term “absolute” truth because it implies that there may be truth which is less than truth; nor “relative” truth which suggests a sort of *quasi* truth that may be true from one stand-point and not from another; nor “contingent” truth because it signifies that what may be false should be presumed innocent until its guilt is proven, I have no fault to find with the term “self-evident” truth, as it

means a truth which proves itself,—fits into human consciousness without demonstration, — nor “demonstrated” or “demonstrable” truth, for these terms do not suggest any qualification of truth itself, they merely imply the process whereby we become conscious of it.

Mind, however, that I am not speaking of that truth which can only be discerned spiritually, or through what has been called revelation. I believe there are truths which can, in the present state of existence, be found by no other means than revelation. But the history of the human race, if it proves anything, proves more convincingly than anything else, the danger and unwisdom of giving credulous attention to those who claim to have found spiritual truth. The human race seems to have stood, from its infancy to the present time, in an attitude of reverent submission before the Spirit-world, with implicit faith that

it contains the infinite store-house of Truth, where an answer to every question, whether mundane or spiritual, can be found. Man has always been afraid that some spiritual message should come to him unheeded or unrecognized. This mental attitude of the race toward the spiritual has furnished an excellent opportunity for all sorts of cranks, confidence-men, and insane seekers of notoriety, and they have never been slow to take advantage of it. Hence, we have always presented to us the spectacle of multitudes following such as these, and ready to believe that in heaven there are round triangles and square circles, if their "prophet" declares the fact so to be.

Let us not be so unwise as to think that there are two degrees of truth, one for heaven, and another for earth. What is truth anywhere is, of necessity, truth everywhere. John Stuart Mill,

though he was a philosopher, in order to equip himself for attack upon one of Spencer's propositions, appears to have persuaded his own mind, in some inscrutable way, to conceive the possibility that there may be some distant planet where two added to two will make five. If that were so, then "twice two are five" would be truth in that planet and falsehood in our own ; and if this proposition, inconceivable to us *now*, may be true in some other part of space, it may become conceivable to mankind at some distant period of time. Truth is not of such fluctuating character. Like the eternal God, to whose kingdom it belongs, it is the same yesterday, to-day, and forever.

CHAPTER IV

THE THEORETICAL AND THE POSSIBLE

THAT which is theoretical, and at the same time irrefutably logical, may, nevertheless, lead to a result that is impossible. When this is the case we may be sure that some essential factor was omitted from the premises. Two very ancient and familiar attempts to prove the theoretical possibility of infinite division will illustrate this :

The first relates to the divisibility of numbers,—Divide 1 by 2, the quotient by 2, that quotient again by 2, and so continue to divide each successive quotient by 2. It is inconceivable that a time will come when you will have a quotient not thus divisible. It is inferred from this that a mathematical number is infinitely divisible,—nay, more,—it is as-

serted that the human mind cannot conceive of it as being otherwise. Neither the inference nor the assertion will stand the test of cross-examination. In the first place we know that infinite division requires infinite time, and that which requires infinite time can never be done. However long the division be kept up it must always remain a finite result. An infinite task can never be finished. Such a result as the infinite divisibility of a given number is merely impossible. In the second place, as to the assertion that the human mind can form no conception of a number as being less than infinitely divisible, the reverse is true, for the human mind cannot conceive of a number as infinitely *divided*:—a conception of such actual division being impossible, a conception of infinite divisibility is impossible. We can conceive of the process going on interminably, but we cannot conceive of it as being

finished, either by finite or by infinite intelligence or power, inasmuch as an end to eternity is an impossible conception.

Our second illustration comes from the realm of the material. Let us take Fiske's statement of the current idea as set forth in his "Cosmic Philosophy:":

"Yet we shall find that an absolutely indivisible atom is quite inconceivable by human intelligence. Every such atom, if it exists, must have an upper side and an under side, a right side and a left side, or if spherical, must have a periphery that is conceived as covering some assignable area. Now by no effort of our intelligence can we imagine sides so close together that no plane of cleavage can pass between them; nor can we imagine a sphere so minute that it cannot be conceived as divisible into hemispheres; nor can we imagine a cohesive tenacity so great that it might not be overcome by still greater disruptive force such as we can equally well imagine."

This may look like irrefutable logic, and yet it can be easily proved that

matter is not and cannot be thus infinitely divisible. In the first place the modes of possible subdivision of matter are all included in the three processes of disruption by pulling asunder, cleavage, and explosive energy. In the second place the postulate with which we must start out is that there exists such a thing as absolute cohesion of particles, and this we do not know, and are beginning to seriously doubt. Still, if we assume that such absolute cohesion exists in any form of matter larger than the corpuscle,—a minute subdivision of the atom, we may, for the purpose of the argument, concede that division, as distinguished from the wider separation of things that were never in absolute contact, has been accomplished, and proceed with the work of further division, from the corpuscle downward. In the first place in order to be sure that we are dividing something, and not

merely causing two somethings, not in contact, to move farther away from each other by some repelling force,—as by heat, for instance,—we must assume that all parts of our corpuscle absolutely cohere,—that there is no space between them.

Let us now attempt to disrupt it by pulling it asunder. We must get hold of it upon two opposite sides. The tools with which we do this must of necessity be smaller than our corpuscle. If we cleave it we must first devise a tool whose edge has a lateral dimension less than the corpuscle. If we explode it we must by some means put inside of it something smaller than itself. It is readily seen that in each of these supposed experiments we must accomplish our work before we begin it. In each of them we have been obliged to divide some other bit of matter as small as our corpuscle, in preparing the tool

or other means for conducting our experiment. We cannot deny what Fiske says, that our corpuscle must have "an upper side, an under side, a right side and a left side, or if it be spherical must have a periphery that is conceived as covering some assignable area." Yet we see that this does not necessarily imply its divisibility. On the contrary, we readily perceive that there must very soon come a point where further division is impossible for want of any possible means of continuing the process.

From the beginning of metaphysical speculation to the present time, philosophy has too often failed to make this distinction between the respective values of inductive and deductive logic. Deductive logic, like mathematics, belongs to the domain of the subjective, and, as Huxley said of the "mathematical mill," the results you get depend altogether upon what you put into it. Correct logic,

based upon all the relevant facts, must always lead to truth. But if we begin with a half-truth, our logic, though absolutely faultless, will inevitably lead us to error. No one has succeeded better in illustrating this than Plato, in his "Parmenides." As Fiske tersely puts it :

"In his first argument, Parmenides demonstrates that the One is neither in itself nor in anything else, neither at rest nor in motion, neither the same with itself nor different from itself. In his second argument, he demonstrates that the One is both in itself and in other things, both at rest and in motion, both the same with itself and different from itself. That is, while his first demonstration denies both of two opposite and mutually destructive propositions, his second affirms them both."

A complete translation of the Parmenides dialogue will be found in the appendix.

Philosophy will always lead us into error by deductive reasoning if its argument be founded upon some half-truth,

or some wrong premise. When we started out to prove by logic that numbers are infinitely divisible, we erroneously assumed the possibility of expanding, throughout an infinite Eternity, an effort which in its very nature must be finite. When we attempted to prove that matter is infinitely divisible we assumed the existence of means of conducting our experiment. Starting with wrong postulates we were logically led to false conclusions. When we started with the correct premises the opposite conclusions became at once obvious. In giving these two illustrations my purpose has been only to impress upon the reader the necessity of caution, when attempting to follow the arguments frequently found in metaphysical works. Make sure that the postulate is correct and omits nothing which it ought to contain. I am not to be understood as asserting that any one has claimed that

the class of results we have been considering are within human power,—or within the power of any finite intelligence. What I do complain of is the teaching that we are compelled to believe them possible at all,—possible to *some* “Power” or “First Cause” or “Intelligence” working in some inscrutable way outside of, and contrary to, what we call Reason. We have no proof that this is so, and its nature precludes the possibility of proof, or of reaching a conclusion otherwise than through our reasoning powers. Therefore we have no right to assume that because such task, or any other infinite task, can be conducted interminably by a Supreme Being whose existence is to endure forever, it can therefore be conducted *eternally* by him, or ever reach anything more than a finite result. There is no such thing as conducting any process eternally, for to conduct it eternally would be to con-

duct it to the end of time, and time has no end. So, when we prove that matter is not, by any conceivable means, divisible to any great extent, we have no right to assume that because we still have left something with sides or a periphery it must of necessity be further divisible by some Omnipotent Power.

Finite results alone are possible. Infinite results are impossible, not to Man alone, but to God also, for a *result* is a finite thing and the finite cannot contain the infinite. An infinite result is a mere contradiction of terms,—like false-truth, loving-hatred, inert-motion, finite-eternity, infinite-person. There is no room for such absurdities in the Kingdom of God, which is a Kingdom of Law, Order, and Truth.

CHAPTER V

THE CONSTANCY OF PHENOMENA

JOHN FISKE'S "Cosmic Philosophy" must be a surprise, in one way, to all who have previously read other expositions. We are surprised to find how much easier we understand what he says than what others have said. I believe this is due, first, to the fact that his philosophy is the most reasonable and complete ; second, because he is the clearest thinker of them all.

But none of them, not even Fiske, seems to have found the true relation between common-sense and philosophy. Reid tried to found a philosophy of common-sense, and failed because common-sense is one thing, not everything. Viewed from a lawyer's stand-point, or with a lawyer's habits of thought and

association of ideas, any one thing, a single science, for instance, bears the same relation to philosophy that a single evidential fact, produced upon the trial of an issue of fact, bears to the question at issue. A science, or any other one factor, say common-sense, will represent a single evidential fact. Philosophy will stand for the whole case,—the single result of all the evidence. The opposing attorneys may disagree as to the credibility of witnesses, the significance of admitted facts, the sufficiency of portions of the evidence. Thus disagreeing they will differ in their inferences as to what the evidence means considered as a whole. So with philosophers. They may disagree as to the credibility of some of the evidence upon which a science is founded, or as to the sufficiency of certain facts to establish certain scientific conclusions, or, as is oftener the case, concerning the real mean-

ing and significance of the admitted facts of science, and, so disagreeing, their philosophies will be unlike, for true philosophy is the lesson to be learned not from any one science or one thing, nor from any number of sciences or things less than the whole, but from a study, weighing, and comparison of all things known.

Common-sense has its place in philosophy but is not itself a philosophy. Its chief usefulness in philosophy is in governing our mental attitude toward the facts themselves, the process of grouping and considering them, and the criticism of any result to which they seemingly lead. Common-sense, then, while not philosophy, must permeate from beginning to end any system of philosophy which is to be at all enduring.

But what is common-sense? It is the consideration of questions not from the stand-point of the individual but from the

common experience of mankind. Now this seems to be where all systems of philosophy make the greatest failure. Take, for illustration, the wrangle between those who affirm the existence of noumena and those who deny everything but phenomena. The common experience of mankind is ignored by both. The Idealist says, "I cannot affirm the existence of anything independent of my consciousness." The Positivist says, "True; but that does not prove your case." "But," retorts the Idealist, "do you affirm the existence of anything apart from your consciousness?" "No," is the answer, "I neither affirm nor deny it." Now there is too much "I" and "You" in all this to give it a speaking acquaintance with common-sense. Even Reid, the apostle of Common-sense Philosophy, seems not to have realized what common-sense really is, for if he had, he would not have

suggested to Berkeley that if he wanted to find out whether, when he bumped his head against a lamp-post, he was bumping a real head against a real lamp-post, or an ideal head against an ideal lamp-post, he should do anything so illogical and so far from common-sense as to try it upon himself. It would have been a common-sense suggestion to Berkeley to try it upon everybody that came along. It would not have been common-sense for Berkeley to follow that advice. If Berkeley were the only being on earth, and the only one who had ever been on earth, there might be excuse, of a sort, for his conclusion that inasmuch as his own consciousness was the only thing that gave him any knowledge on the subject, then his own consciousness was necessarily the only fact proved and therefore the lamp-post, as an actual factor of the equation, was eliminated. But the fact is that ever

since men have known how to express their states of consciousness they have always agreed with each other. If that lamp-post had stood there ever since the first dawn of human intellect, and it had been the fate of all who ever came into existence to bump their several heads against it, each would have had the same consciousness as to the shape, color, and rigidity of the thing bumped against, and the nature of the sensations following the collision. Bring every member of the human race separately to the dime-museum to look at "the only checkered horse in the world," and then take a photograph of it and show it to each separately and each will recognize it as what he saw. Ever since travellers began to travel in strange lands they have individually seen and been conscious of the same things that all others have seen there. If one traveller should draw a picture of the leaning tower of

Pisa as looking like a tree, another as looking like a water-fall, another as a triangle, another as a cow, and so on, we would know that things are not what they seem, but the mere creatures of the individual consciousness of the observer. Perfect agreement of all the witnesses as to the shape, color, and sensible effects of an object which has come into their consciousness through the senses, is treated in law as the supremest test of provable truth. But the testimony of a million witnesses all agreeing that a certain tree which they all describe alike is growing in a place which they all locate alike, though no human being would be foolish enough to disbelieve it, would be slight indeed compared with the consensus of human opinion coming to us from the remotest ages, that rivers are rivers, that seas are seas, that mountains are mountains, that grass is grass, and trees are trees, that missiles and

weapons will wound and kill, not only men but brutes, that winds will blow and rains fall, that the sun shines by day and the moon and stars by night, and so on throughout all the countless phenomena of external nature. It is not the consciousness of the individual that should be called as a witness, but the consciousness of the whole human race everywhere and always.

Looking at external phenomena from this stand-point we find ourselves absolutely forced to accept one of two conclusions,—either these phenomena proceed from and are caused by actual objective realities,—noumena cognizable by the senses,—or there have been innumerable multitudes of chance coincidences, whereby every one has happened to think exactly as every one else has happened to think, and, further, that during all future ages every one will happen to think just as every one

else happens to think now, and just as every one has always happened to think about these phenomena. This, being inconceivable, is not true according to any present system of philosophy. So that philosophy, though it tells us that the highest test of truth is absolute uniformity of experience, permits the Idealist, without even a protest, to assert, as a philosophical truth, that which is absolutely contrary to the uniform experience of all people everywhere and during the whole period of human existence.

Mind, I do not mean to say that all philosophers deny the noumena. But there are too many of them willing to concede the claim of the Idealists that we can have no conscious knowledge of noumena ; too many who, while willing to admit that the little red school-house with its bell clanging is surely something, still insist that it may be, and very likely

is, in its *reality* which they assume we can neither see nor hear, something entirely different from what phenomenally it looks and sounds like. When philosophers concede this, what becomes of their experience test of truth? If the experience be an illusion, how can it lead to truth? Must not an illusion lead us to an illusion? The absolute persistence of phenomena is the best proof that they tell us the truth, the whole truth, and nothing but the truth.*

* See APPENDIX, title NOUMENA.

CHAPTER VI

THE FINITE AND THE INFINITE

It is not without purpose that the Finite is given first place in the title to this chapter. We have, during a brief period, grown more or less accustomed, through altered religious teaching, to hearing the Infinite in extent and quantity spoken of as infinitely superior in every other aspect, as well as in bulk, to that which is Finite.

But if we look about us, in Nature, we find every energy that is active directed to the segregation of portions of the Infinite, and changing these portions into more or less durable *forms*. Infinity has no form, because form means outline, and outline means the Finite. The infinite mass of matter is dead, futile, inefficient. When a part becomes

separated from it, then, and not until then, is the beginning of evolution. All that lives, all that contributes to life, all that is governed by Law, all that is endowed with Mind is finite in bulk.

As to that which is infinite, no economy is needed, as it can never by any process be increased or diminished. The infinite energies stored within it must ever remain dormant, for radiant energy means motion, motion of anything means room outside of itself in which to move, and the Infinite leaves no space outside of itself. "When I lift my hand I move the stars in Ursa Major," said a popular preacher. Possibly. But, granting that by moving his hand he disturbed the equilibrium in Ursa Major, he did a more wonderful thing in moving his hand, for he thereby imparted motion to the inert matter of his physical body, through his mental energy,—his will power. However far this movement of his body

might, through the law of gravitation, extend to other regions of space, neither that nor any other finite motion, however great, could affect Infinity. Upon the outer confines of our sidereal universe what storms may come! Even with the thin covering of atmosphere around our globe, temperature, motion, electricity, produce storms of such awful force that they appall us. Yet these are mere nothings compared with the primeval convulsions that took place when our atmosphere was a thousand miles deeper, in that long ago when the earth was beginning to cool. Eruptions have been photographed that took place upon the sun, lifting masses of matter to a height of 280,000 miles above the sun's surface. Yet what are these puny exhibitions of cosmic forces to what might occur if a strayed sun should plunge into the depths of the infinite mass,—into that farther beyond, surrounding the stars,

where room and storm-producing material are illimitable and unfathomable! Inconceivable quantities of gas, star-dust,—or whatever it may be, would ignite and explode in the wake of that plunging sun. The contrast of temperature between the burning and exploding gases, or clouds of matter, and the intense cold of the sidereal spaces into which they were forced, would create cyclonic disturbances powerful enough to toss and play with little planets like Jupiter as our earthly winds toy with grains of dust. But this would not disturb the Infinite. The vibrations caused in the neighborhood of these disturbances might impart themselves to other regions of matter, going on and on for countless æons of time; they would never disturb the Infinite; they would never reach the Infinite. They would never affect anything but the Finite. The Infinite would ever and

always lie beyond. However far, and long, these vibrations travelled, they would ever remain as far from the Infinite as when that universe-convulsing explosion took place. There ever lies beyond, an infinite mass of matter which finite disturbances, however vast, can never reach. All the energies exhibited in the finite universe are stored in this infinite mass, but they give no sign ; they have no sum-total, for a sum-total is a finite thing. It is only from the Finite that the energies of attraction, heat, light, electricity, are radiated. Infinity can exert no influence, for every influence is a finite quantity that begins somewhere, and sometime, and though it may never end it can never reach the end ; therefore it must always remain finite. It is only through the Finite that anything can be done. The Finite is motion, evolution, progress ; the Infinite is stagnation awaiting the quickening

impulse of the Finite to arouse some portion of it into activity and life. The Finite may be of infinite duration ; it may have had no beginning, and may never end, for the Infinite contains infinite possibilities, and is made up of an infinite number of finites ; as, for instance, matter, which is an infinite mass of finite corpuscles. But let us not go astray here. The Infinite contains no germ of the impossible, for there is that which is impossible in the absolute. Infinite space harbors no locality where twice two does not make four, where there are ranges of mountains without valleys, where the end will not be later than the beginning, where anything can be accomplished without the lapse of time, where falsehood is truth, and love is hate, where there is no difference between heat and cold, light and darkness, motion and rest, where forms are without outline, where space can be con-

densed or moved, where nothing is something, where design and chance are the same thing, and produce the same effects. These wild incoherent imaginings have no place even in the Infinite, which only harbors the possible.

Hence, although Jesus gave voice to a great truth when He said: "With God all things are possible," it is a truth that has often been foolishly interpreted to mean that the opposite thereof is also possible to Him,—that He can produce things from nonentities, unrealities, or perform any sort of absurdity. All *things* are possible, and all that is possible lies within His power, but when in our childish fancies we wander into the realm of the impossible,—that which is impossible absolutely,—we travel outside of infinite space,—outside of God's Kingdom into a land of Nowhere:—a "Fool's Paradise." There we expect results contrary to Law, contrary to

Truth, inconsistent with Reason. Some pray for such results, and, failing to secure them, humbly attribute their disappointment to lack of faith or of deserving. Others who do not pray are equally disappointed, and "declare in their hearts that there is no God." And this is truth, for in that land of Nowhere there is neither God nor anything but the childish fancies of the ignorant. "God is in His heaven ;" God is in His Kingdom, looking with an infinite compassion upon all who expect to find Him elsewhere.

CHAPTER VII

IDEAS OF GOD

BELIEF in God seems to have been common among men many thousands of years ago. It is doubtless a very primitive idea. It was a familiar one when legends of remote antiquity took form. It is found in the language of that lost, or rather, widely assimilated race, the Aryans, whose primitive words are yet spoken by their descendants, the races of Europe, Persia, Afghanistan, Beluchistan, and Hindustan, and whose name for the Deity is still in common use among the Latin races.

Primitive conceptions of God always took the form of Personality. This was then, as it still is, the only idea of God that can be grasped by the human mind. Modern philosophers who refuse it do

not undertake to substitute anything for it. They call it the "Unknowable." "Inconceivable," etc. But, throughout all lands and in all ages, it has been observed that form and intellect are yoked together. Man has thus learned to associate them with each other. Hence the idea that God has *form* is still the belief of almost all who have any belief at all in God. To them He is a Being apart from nature, exerting an influence over nature, but not of it.

Yet the earliest extant writings in languages long dead—Sanskrit and Greek—give evidence of another idea,—the Nature-God,—personified in the elements, fire, air, and water, often divided into several Gods, making themselves manifest in light, heat, wind, rain-clouds, frost, lightning, and other natural phenomena. This idea has also survived to the present day, although less generally accepted than the other.

Both ideas are still accepted by most people in their primitive forms, but among a gradually increasing class—the educated—they will be found under phases more or less changed. The greatest variety of these changes have occurred in human conceptions concerning the Divine character; but the most important change in every way is that which relates to the question,—one, or more than one God. And although Polytheism is still believed by many peoples, all who can justly claim to be civilized, whether they believe in a Nature-God, or in a God outside of nature, have been converted to the monotheistic belief. The latter class have found no difficulty in this change; but the former have always encountered obstacles in reducing their creed to any simple and readily comprehensible form of words, and this embarrassment has grown with the advance of scientific discovery and

consequent modification of old views as to the real extent of nature.

Xenophanes, a Greek philosopher, taught that there exists but one Entity,—God; that all things are either parts of Him, acts done by Him, or illusions. But Xenophanes lived more than five centuries before the Christian era, and at that period scholarly notions of the universe of nature were quite finite and simple. From the view-point of his time there existed, chiefly the earth, and, surrounding this, an important yet comparatively insignificant remnant of nature consisting of sun and moon, with a few stars which “wandered” and some thousands of stars that were attached by way of ornament to the revolving vault above. With such an idea of nature, nature could be God and God nevertheless a comprehensible Personality. Later the Nature-God idea developed into its three present forms, all

classed under the generic title of Monism. These are :

1. *Idealism*, holding that phenomena both spiritual and material are from Spirit.

2. *Pure Pantheism*, holding that both matter and mind are illusions, and nothing really exists but God.

3. *Materialistic Monism*, which holds that all phenomena both material and spiritual are from matter.

The several results of these ideas vary, in that the first leaves room for belief in God and human immortality; the second admits of belief in God, but not in immortality; while the third forbids either belief, and is a striking instance of utter antagonism between the seed and the fruit grown from it. It is no longer an idea of God in any form, but is the reverse. Monism is the belief that all phenomena must in the last analysis be traced to some one cause;

as all three of these ideas are of that character,—assigning as the ultimate source of all phenomena the respective causes, Spirit, God, Matter,—it is correct to class them all as Monistic beliefs.

Among the early Christians the ideas of the school of Idealistic Pantheism, which was a great moral force among the Greeks of that day, gained some headway, the result of which was the Athanasian Christian sect. Later, however, it was suppressed, and thereafter it never gained a foothold of any consequence among Christians until the present generation. Now, however, Monistic ideas are making great headway among Protestant Christians. Some celebrated and worthy ministers have declared their adherence to the doctrines of Idealistic Pantheism, although they, for some unuttered reason, choose to give it some other name if they give it any, which they do not always. The

views of such men have been limpingly followed by constantly increasing numbers of graduates of theological schools who appear to have only a vague comprehension of the Idealistic Philosophy or its ethical or moral import, and occasionally voice, in their pulpits, their cloudy ideas in such wise as to sow doubts in the minds of their hearers, without having any realizing sense of the effect their words may have, and without sufficient knowledge of the subject to remove the doubts if they become aware of them. I have often met people who could glibly declare their belief in God and their disbelief that He is a person. This expression of opinion, for which in most cases its holders could give no reason when pressed for one, was a *fashion* until quite recently. It is now dying out; even the Idealists are abandoning it, for, as Fiske says, "Through Nature to God," p. 166, "The

Human Soul knows better ; it knows at least what it wants, and resists all such attempts to palm off upon it stones for bread"; and the same author says, "Idea of God," p. 135, "The total elimination of anthropomorphism from the idea of God abolishes the idea itself."

It will readily be seen, from what has already been said, that no other form of Monism than that known as Idealistic Pantheism could ever gain headway among Christians. The greatest modern teachers of this idea have been the Germans, Fichte, Schelling, and Hegel ; the Irishman, Bishop Berkeley ; and the Americans, Ralph Waldo Emerson and John Fiske. With constantly enlarging ideas of the extent of matter crowding upon them from the developments of modern science, the Idealists at last found themselves confronted with a volume of matter which seems to be infinite in extent, so that if nature is co-

extensive with matter, a Nature-God must be immanent and omnipresent throughout infinite space, and the idea of His personality must be given up, for the Infinite has no boundary, and so can possess neither form nor outline, which are intuitively recognized by the human mind as inseparable from personality. The idea of God was quite logically, and necessarily, relegated to the "Unknowable," "Unthinkable," "Inconceivable," "Incomprehensible," and so on; each exponent of Idealism recognizing that no name conveying an idea could be given to that which is unimaginable. Fiske's faith in God was too strong and virile to admit this. He rebelled, and taught an Idealism different from all others. He followed the old teaching to the point where his clear, logical, common-sense mind realized that if he went farther he must give up the idea of God altogether. There he

drew the line. Perhaps his effort to defend his idea of an *Infinite Personality* is not very satisfactory. But that is outside the scope of the present chapter, and will be referred to more at large hereafter.

CHAPTER VIII

THE SPACIAL IDEA OF GOD

I WOULD be glad to tell my readers just when and how the habit of attributing *spacial* infinity to God crept into Christian teaching. But I have not been able to find out. Certain it is, however, that no warrant exists for it in either Old or New Testament. There is one passage of Scripture where the adjective "infinite" is used in connection with the Deity,—Psalm cxlvii, verse 5, "Great is our Lord and of great power ; his understanding is infinite." I hope presently to show that the adjective "infinite," applied to God's understanding, makes a very different sense of infinity than it will when applied in the spacial sense. The human mind has an intuitive perception of the truth that space is unlimited in

extent. We are told that space has three dimensions,—length, breadth, thickness. This, however, is only true as to portions of space, not as to space itself. It is simply impossible to imagine a boundary beyond which there exists no space. To say that space is infinite really adds nothing to the meaning of the word space, nor to the mind's intuitive conception of it. We are told sometimes that infinite space cannot be *comprehended*. No self-evident truth can be comprehended. We cannot comprehend our own existence, or our own consciousness as to anything. We do not need to comprehend this class of facts, because being obvious in the most absolute sense we ask for nothing more. We cannot comprehend that space is not infinite, because we are conscious, intuitively, that the statement is false. So with Time. We intuitively know that there never was a past which did not

have its yesterday, and will never be a future without its to-morrow ; for we are conscious, without being taught, that time is also one of those things the nature of which forbids beginning or ending. There have been casuists who, whether they believed themselves or not, attempted to prove that neither time nor space exist, but no one has been foolish enough to argue that, conceding their existence, there could be limit to either.

As to things that can be comprehended, they must first be reasoned. But as to truths that are self-evident, reason has nothing to do with them, nor has comprehension. Yet they are as obviously true without reason or comprehension as truths discovered by induction or deduction, which can be comprehended and explained. We know that we exist to-day ; that we existed yesterday ; that there are such facts as Life, Time, Space. It is impossible for

us to know anything better than we know these things. This is *absolute* knowledge ; yet we never learned it ; we know it because it has been in our consciousness during all our conscious existence. But we cannot comprehend this knowledge. As Sir Wm. Hamilton, a Scotch metaphysician and philosopher of the last century, says, in his notes upon Reid's Philosophy of Common-Sense : "It will argue nothing against the trustworthiness of Consciousness that all or any of its deliverances are inexplicable or incomprehensible. To make the comprehensibility of a datum of Consciousness a criterion of its truth would be, indeed, the climax of absurdity."

And Fiske speaks to the same purpose when he says : "It is indeed a popular misconception,—a misconception which lies at the bottom of that manner of philosophizing which is called

Empiricism,—that nothing can be known to be true which cannot be demonstrated.” And Fiske goes on to prove the absurdity of that idea, and the utter impossibility of demonstrating “self-evident” truths, as he calls them,—being the same class of truths which Spencer describes as “universal and unchanging facts.” (I “Cosmic Philosophy,” Chap. iii.)

If the human mind possessed intuitive consciousness of the spacial infinity of God we should not be troubled by our failure to comprehend the idea. It would be accepted as other self-evident facts. But, in normal minds consciousness never contradicts the truths of experience, or the orderly course of nature, and so, when we have learned that certain rules apply to certain conditions in one realm of nature, we expect to find the same rules in force wherever the same conditions exist. In other words,

we are conscious that what is truth here and to-day is truth everywhere and always. Therefore, having learned that, throughout terrestrial nature, the power to act and move, and the ability to impart knowledge or motion to persons and things, are invariable attributes of the Finite, our consciousness forbids us from accepting belief that the Infinite can have any of these virtues, or that it can impart to others what it does not itself possess. The qualities of fixedness, inactivity, immobility, belong to infinite space, and so they necessarily belong to everything that is spacially infinite. Within space, finite forms and personalities are possible, and they may move, exert force, and accomplish results within space, but not throughout space. If God filled all space, He would be inert, immovable, devoid of power, understanding, will, or any quality that is found in the spacially finite. He would

not be the "Supreme Being." He would not be a Being at all, and could not be, for an impersonal being is a mere contradiction of terms which annuls itself, and is therefore intuitively rejected by the human consciousness. Personality and Infinity, considered spacially, cannot exist together, for the one is compelled to have form and outline while the other cannot possibly possess either.

But if we are unable to believe that God is of infinite proportions; if we cannot imagine anything spacially infinite as possessing intelligence or the power to move or impart motion, we can be satisfied with the Scriptural declaration, "Great is our Lord and of great power." And we can readily accept the Psalmist's declaration, "His understanding is infinite;" for that is quite another thing, as we shall see. It will be apparent that if matter does not fill infinite space, nature can never be co-

extensive with space and must therefore be always a finite quantity, so that a Nature-God would of necessity be also a finite Being, and must ever remain finite, because we know that what is not now spacially infinite never can become so. Whether matter be spacially infinite or not we can never know. But that such is the belief of scientists and that there are convincing reasons for such belief will be shown in another place. However, if matter be not spacially infinite, then God, if He be a Nature-God, is spacially finite, for nature cannot exist where matter does not exist.

Again, if we shall be compelled to believe that matter is spacially infinite, but that the region of space is finite wherein matter exhibits those varied forms, motions and phenomena, known in their totality as the universe, or nature, then the God of Idealistic Pantheism is of necessity a finite Being, for He exists

only in and throughout nature, and nature being now finite can never become infinite.

But, again, if we conceive of primary matter as filling infinite space, the combinations under which its corpuscles can now assume the forms known to the chemist as atoms and compounds are a finite number. In other words, the properties of primal matter,—its possibilities of adaptation and use, comprise only a finite number, all of which God understands. And, understanding what can be done with matter in a finite part of space, He understands what can be done with it everywhere; and what He has power to do with matter in the finite universe He has power to do with it everywhere; therefore “His understanding is infinite,” and not only that, but His power is infinite. Thus we see that a spacially finite God can possess infinite knowledge and infinite power, and that

nothing but the spacially finite can possess any knowledge or power whatever. God then is *the* Supreme Being ; His task is an infinite task ; His workshop infinite Space ; His work-day Eternity.

CHAPTER IX

AN IDEALISTIC DILEMMA

As will be shown in Part II. of this book, the strong tendency of opinion in the field of astro-physical science is toward a belief that the sidereal system is of finite dimensions. As the famous astronomer, Miss A. M. Clerke of Dublin, states it: "The probability amounts almost to a certainty that star-strewn space is of measurable dimensions." In Part II. will also be presented the argument of logic in support of the same conclusion,—that any effort which manifests itself in the changing of portions of infinite quantities to finite forms cannot possibly attain more than a finite result at any period of time. Should this become the doctrine of Science, as now seems likely, what effect will it have

upon the Idealistic conception of the Deity? Assuredly there will be but two alternatives: either Idealists will be at war with Science, or they will return to the old Greek Nature-God, who, inasmuch as Nature presented a finite quantity to the conception of the Greeks, was necessarily a finite Being spacially. While this would remove the difficulty of an inconceivable, spacially-infinite personality, it would necessitate an entire change of front. For the fundamental credal tenet of Idealism is, as expressed in December, 1904, by a noted American clergyman, "I believe in a God who is in and through and of *everything*." This is the corner-stone of Idealistic Pantheism. And it is not interpreted by Idealists as being a mere figure of speech, but as stating the actual fact believed. There is a tree; it is a part of God; a cow, a dwelling, a church, a saloon, a school, a brothel, a bayonet, a

gambling device, a prayer, a curse, a glass of whiskey, a loaf of bread: all parts of God. A kindly soul devoting life to helping mankind; a cruel mind planning murder; a stock gambler plotting wholesale robbery; a trust magnate devising a scheme of extortion; the chief executive of a nation trying to prevent injustice; God is in and through and of them all. Well, while the proposition is inconceivable and unthinkable, that God was in the murderer's mind planning that murder, or in the mind of that wholesale robber helping him to work out his iniquity, suppose nevertheless we grant it. What is the result? Is God in and of and through all matter throughout infinite space, or is He only in and through and of that portion of matter which has been taken from the infinite mass and changed into finite forms? If infinite space were filled with those things which the Idealist is so fond

of referring to as "manifestations of His all-pervading *presence*," that would be one thing. But if only a part or parts of space contain these evidences of the presence of this Idealistic Deity, is He also present throughout that infinite stagnant mass where there are no such "evidences of His presence"? If He is only present where those evidences of His presence exist then He will assuredly grow larger as the bounds of nature become extended. Carlyle once let drop a *bon-mot* about an absentee God sitting idle on the edge of His universe ever since He created it, and watching the wheels go round. Ever since then Idealists have shaken in our faces the "Absentee-God" bogey. The Idealist is falsifying our position. We believe, every whit as much as he, that God's influence is constantly active. We do not believe it is necessary for God to be actually present in order to

accomplish His work. Perhaps if the Rev. Lyman Abbott chooses to ridicule the almost universal Christian idea of God, by echoing Carlyle's shallow witticism about an "Absentee-God," he will not object to being paid in his own kind by a few questions relative to the Idealistic Joss. It really seems to be a Joss very far from having the infinite power ascribed to Him, for He seems able to act only where He is *present*. It is a Joss with less radiating force than a twenty-first magnitude star,—yea, less than the bits of nebulae which send their lights to us from the outer confines of stellar space,—even less than the impalpable dust particles of a comet's tail which send their infinitesimal reflected rays to us from beyond the sun.

There has always been revolt, both among philosophers and astronomers, against the idea prevalent among physicists, that there can be no such thing in

the physical universe as "action at a distance." It was first pretty thoroughly punctured by Fiske, as will be shown in a subsequent chapter, and is now being seriously questioned among the physicists themselves. "Can a thing act where it is not?" No one, however, denies that this action at a distance takes place; but to get over the difficulty by supposing an intervening ether, "as rigid as a diamond, yet impalpable," is like jumping out of the frying-pan of mystery into the fire of inconceivability. Whatever may be the explanation, there is some means by which light travels, and the energy of attraction. Could not this Idealistic Joss do as much? No. He must be "in all, and of all, and through all," He cannot act where He is not present. Thus we have a convenient physical fiction erected into a spiritual reality, through a process of idealistic dreaming. And really the

Idealists have not added any dignity to the conception of God by increasing His size so that He may be actually present everywhere throughout creation, if creation is finite ; for, in the first place, that sort of size—spacial size—does not suggest increased mental or spiritual power, and, in the second place, if it did, there would be still, outside of any place where this God of the Idealists has “manifested His presence by His works,” an infinite space where He is not, and where He never can be until infinite space becomes finite. And if the Idealists do not choose to take that position, but think it better to change their belief to a God who is “in all, and through all, and of all,” but only “manifested” in a finite part of space, have they given to the world anything worth while? They have given us the inconceivable idea of a God who is *infinitely idle and finitely busy*.

CHAPTER X

ACTUS DEI

"THE act of God" is a phrase often met with in the jurisprudence of the common law. Bouvier defines it as "Any accident due to natural causes directly, and without human intervention." Another writer says, "The term applies broadly to natural accidents, such as those caused by lightning, earthquakes, and tempests." *Actus Dei nemini facit injuriam* is a maxim of the common law, and its legal import is that no person will be held liable for a default in his contract occasioned by the "act of God," unless the contract expressly imposes that liability. However, it is not with the maxim itself that we have to do in the present chapter, but with the underlying idea which ascribes to a

Divine Providence all accidents due to the inherent properties of matter. For John has handed down to us the wise teaching that "All things were made by Him, and without Him was not anything made that was *made* ;" and this has been imprudently interpreted to mean that God not only made all things which are, but that He produced, or caused, the infinite mass of matter from which things, *i.e.*, *forms*, have been made.

It was not in the *Æneid*, nor the *Odyssey*, that the gods first loosed the winds or calmed the waves. The remote antiquity of those classics is modern indeed compared with that far-away day when the prototypes of *Æolus* and *Neptune*, and their kindred nature-gods, first took the form of ideas in some reverent mind. The belief that natural accidents are due to spiritual agencies pervades all literature, and all theologies, living and dead, and is as prevalent to-

day among people, civilized and uncivilized, as it ever was. Dissent there has been from it, in a way, among both ancient and modern theologians, but unfortunately this dissent has never undertaken, except in a very few minds, to reconcile the obvious fact of natural evil with belief in a benevolent God. The vast majority of the dissenters have been content to attribute natural evils to an evil spirit, the enemy of God and man, or to treat them as punishments inflicted upon evil-doers, by a just king, or if neither of these alternatives suited the facts in the case, or the moral consciousness of man, the matter was catalogued as one of "The inscrutable ways of Providence."

A recent writer, a man possessed of brilliant qualities of mind, and of the most kindly impulses, but withal having narrow prejudices, and lacking deep research, epitomizes what has been, per-

haps, with the masses in Christian lands, the most seductive argument of Atheism. He says: "An Almighty Friend who cares nothing for us, who allows us to be stricken by His lightning, frozen by His winter, starved by His famine, is a friend I do not care to have." The religion of Jesus Christ, humane and sympathetic beyond all others, when gathered in its pristine purity from the Gospels, tends to develop a spirit vulnerable to this form of argument. We see earthquakes, thunderbolts, winds, waves, heat, cold, deluges and drought, bringing injury, disease, and death to the just and unjust, the careful and negligent, the wise and ignorant. We know that man has no power to guard himself absolutely against any of these dangers, and that in the face of some of them he is utterly helpless. Are these the acts of God? Have not these natural evils been disappearing from the world? Are they

not trivial indeed compared with what they were in earlier stages of evolution? Geological research leaves us no opportunity to question this fact.

What has caused their gradual elimination? Who is responsible for that? Did God do both these things? Did He first bring natural evil into the world purposely, and then, repenting, proceed to take it out of the world again?

Let me say that Idealism has never answered, or attempted to answer, that question. And however much Idealism may refine terms and attempt to satisfy us by discriminations between the Finite and the Infinite, it will never give us anything as good as the human God of the Old Testament, until it does tell us why its God brought evil into the world and then proceeded to eradicate it. And I do not refer to natural evil alone. That is used as an illustration because it is the most obvious and tangible. But there is

the evil in the human mind ; and this is as much greater than the other as mind is greater than matter. It is also, permit me the liberty of thanking God for the fact, disappearing. Men are better than brutes, and men of to-day in civilized countries average better than savages, and the civilized man is increasing, the savage disappearing ; and among civilized men there are those whom all instinctively recognize as higher types of humanity. The world is growing better. The world is getting rid of evil, both natural and moral. The process is slow, but it is sure, because it is evolution, and evolution is one of those things which can never end. Who is doing this? Are the evil and the destruction of the evil traceable to the same source? Let Idealism give us an answer,—a plain answer,—one that is not beclouded by metaphysical fog, and we will accord it credit for a philosophy worth while.

"God is the creator of evil" is the bold assertion of John Fiske : "Through Nature to God," chapter vi., page 38.

Fiske was in many respects a wonderful man,—a man of deepest conviction, sublimest courage to face the truths of science, whatever they might be, and a man whose faith in God and His goodness, and even in His personality, was inextinguishable. Have there not been other men of whom as much can be said ? Yes, many of them ; and it is not in these respects that Fiske was unique, but because he could retain these ideas while imbued deeply with Idealistic philosophy. He never shirked the inexorable logic of the Idealistic scheme. If God was the source of all, then certainly He was the source of evil, and all that remained was to show a valid excuse for it. But when it came to that, Fiske was weak ; an intellectual giant, he failed, simply because the task was impossible. The reader

will, I hope, procure the book referred to and judge for himself whether I state the argument fairly, and whether it is not true that his analysis of the origin of evil runs counter to the very foundations of the philosophy which he defended.

Fiske's argument begins very simply: without contrast there can be no conscious life ; if there were no color but red it would be as if there were no color at all ; if everything tasted like sugar, there would be no such thing as taste. If there were no such thing as pain, we could not recognize physical pleasure, and therefore it would not exist. If this were a sinless world, we could not be conscious of goodness or morality any more than we are of the pressure of the atmosphere which is always upon our bodies. Consequently in a happy world there must be both sorrow and pain, and in a moral world the knowledge of evil is indispensable. This is all true, of course, but it

suggests a limitation of God's power,—the very thing Fiske was trying to avoid. And it does not prove that God created evil. Let us see if it does. If God created evil, then there was a time before its creation when evil did not exist, consequently good did not exist. But if God created these things, He existed eternally before them, and, as neither can exist alone in any consciousness, they must have been brought into existence simultaneously by a being who lived eternally without conscious knowledge of either.

Now let us see where we are. First, we have an eternity during which these two things, good and evil, which comprise the sum total of all ideas, and which the Idealist tells us cannot exist outside of consciousness, did not exist, for God had not yet created either of them. Will the Idealist give us some sort of idea of anything that God could have been dur-

ing that eternity before good or evil came into existence? A God living eternally without knowledge of good or evil! Are we witnessing a revised edition of the Eden drama,—the Tree of Knowledge of Good and Evil, with God in the rôle of Adam?

But having entered this storehouse of incongruities let us see what else there may be. This God of Idealism having created good and evil, we must be informed why it was done. We have already been told that neither of them can exist consciously without the other. Well, what is the meaning of that adverb “consciously”? As they are pure ideas they cannot exist at all unless they exist consciously. Now, did the God of Idealism *plan* what use He would make of good and evil before they existed? Impossible. A plan about something not existing, even in consciousness, is inconceivable. Yet that is just where

Idealism brings us : to this inconceivable conception, this unthinkable thought. Why does Idealism bring us here? Simply to prove that there are no limitations to God's power,—that nothing exists except what He has caused or made. And yet the very first postulate of this argument of Idealism is an absolute and infinite limitation of the power of God, namely, that He could not create a happy world without sorrow and pain, nor a moral world without evil. Nor do I gainsay this, for my own argument is founded upon the distinction between the possible and the impossible, between things and nothings. But I mention the fact that Idealism thus limits God's power in order to show how utterly it fails in its attempt to devise a system of theology which makes Him the cause and source of all things. Thus Idealism, not satisfied with putting the cart before the horse, smashes both horse and cart into

an inextricable and useless mass, and, in the "confusion worse confounded" which it has produced, asks us to find and believe in a God who lived eternally without knowledge of good and evil, whose power is unlimited yet infinitely limited, who made a plan about good and evil before they existed in His consciousness, and who, although He created evil, dislikes it, and is destroying it. Is this a philosophy? Is it not, rather, a maze of empirical absurdities? Is it not more reasonable to believe that both evil and good are eternal ideas, coeval with God; that He always hated the evil and always loved the good? Where was the evil if not in Him? How did it exist if not through Him? I make only this reply *now*. It has never been claimed even by Idealism that God created time or space. If there be some things that He did not create, why not others? Is it not more reasonable to believe that moral

ideas are eternal than to attempt to explain evil and good in the way we have just witnessed? Is it not better to follow reason than chimera? We intuitively know that a good Supreme Being would not bring a bad thing into existence; we know that if God is wise He will not be found destroying His own work, having found it foolish or wrong. We are absolutely compelled therefore to absolve Him from the charge that He created evil, for no class of Theists will be more ready than the Idealists to admit that He is infinitely wise and good. This answer of Fiske will never do. It contradicts reason, and has not even the poor excuse of necessity, for there is surely no case of mental duress here which drives us to assume that God created evil because there is no other possible way of accounting for it. The Idealistic process of approaching the beginning of things has never been carried by its advocates

to its deepest logical conclusions, else we should have been told that God created time and space after first creating Himself. God is self-existent, and the fact of self-existence being conceded in one instance, the mind finds no difficulty in conceiving it as to others. Impossibility has relation to the nature of things, not to numbers of instances.

Phenomena may be traced to secondary causes, and therefore man may be encouraged in attempting to find more remote causes. But Space, Time, Matter, Truth, Falsehood, Love, Hate, Good, Evil, Mind, Spirit, Life, are not phenomena. They are eternal realities where-with God has power to do all *things*. He cannot do with them that which is impossible in the absolute sense ; for example, He cannot change them into one another or destroy them. But He can change them into finite forms and personalities, and endow these with the

blessings of growth and evolution. This He has done, and is doing. His materials, though finite as to kinds, are infinite in quantity. His understanding comprises a perfect knowledge of all things, and is therefore infinite. His time is infinite, His work will never end.

CHAPTER XI

THE STORY OF CYCLONE SMITH

SHALL I tell my readers of the pitiful experience of Mr. Smith, of Kansas? It is only a parable, but perhaps it may give a clearer idea of the mental dilemma into which this poor humanity of ours that craves, more than all else, a conscious immortality in the friendship and kinship of an everlasting, all-wise, and loving God-Father, has been led by divers metaphysical and theological explorers who have called out, "Lo, here!" "Lo, there!"

Mr. Smith was an honest man, a good man who loved his neighbor. Consequently, having never had a "streak of luck" or a "windfall," he did not become suddenly rich. But by many years of patient and loving toil he had managed

to build and furnish a comfortable and pleasant home for himself and his family; and aside from good health, bodily vigor, and a clear conscience, this home was about all Smith had. One day, Smith saw something which induced him to hustle his family into the cyclone cellar, and scarcely had he got them there before the air outside was filled with a tremendous Babel of most frightful noises. It soon receded, gradually growing fainter; Smith peeked out; his house and all that was in it had disappeared.

Smith believed he did not deserve this, but he had heard about such things as "visitations of Providence," and was worried. He went bravely to work to begin life anew, but from time to time, and as opportunity offered, he sought information from his fellow-men, hoping to clear up the mystery, for it puzzled him sorely. From his persistency upon this subject, he finally obtained the title

of "Cyclone" Smith. Most people with whom he conversed on the subject seemed to have about the same sort of idea of God ; but when they came to an opinion as to why the cyclone had visited him, their views varied so widely that he could readily discern they knew as little about the matter as he did. As time passed on and his courage and labor were rewarded by prosperity, business took him to a large city wherein dwelt many wise and learned men, and he determined to renew his quest among them for a solution of the riddle.

The first of the Solons interviewed by Smith was a Pantheist, and, after the case was stated to him, that gentleman delivered himself in these words : "Mr. Smith, God is the cause of everything good, but nothing evil, for evil is a mere delusion, and does not exist, except in the mind. Now, as I understand your story, this cyclone you tell me of was an

unmixed evil ; therefore it was all an illusion. Good-day, sir. I beg pardon, but I am very busy to-day."

When Smith reached the sidewalk he met a citizen of the place and inquired, "Stranger, I beg your pardon, but can you tell me is this house here a private lunatic asylum, or something of the sort?" "Why, no," said the stranger, whose face expressed great surprise at the question ; "that is the residence of Professor Gnough of the Kershago University."

"Is Professor Gnough a slim-built, medium-sized man, say about forty years old, with a goatee, hair streaked with gray, who wears gold spectacles?" inquired Smith.

"Exactly so," replied the stranger, with a more puzzled look than before.

"Thank you, sir," said Smith, and walked on.

The stranger looked after him awhile,

and then, suddenly seeming to make up his mind about something, ran up the professor's front steps, rang the bell, and was admitted. Smith continued his walk. He had another Solon on his list. This gentleman seemed amused. "Why," said he, "what would you have, Mr. Smith? Matter is the source and first cause of everything, but matter has no conscience, no reason, no feeling, and here you are expecting it to act benevolently and justly."

"But," replied Smith, "if matter is the cause of everything, it is the cause of you and me; and if it have no conscience, benevolence, or sense of justice, how did it impart those qualities to us?"

"Well," answered the materialist, "your question assumes an error as its basis. It is true that matter cannot impart qualities that it does not possess, but conscience, benevolence, and such like, are not, strictly speaking, *qualities*;

they are mere evolutions from the mechanical responses of one chemical to the stimulus of another chemical." The gentleman warmed up. "Here," said he, "come into my laboratory and have a look at my actinian. I will show you how those mental manifestations have slowly evolved from instinct, and how instinct has been slowly evolved from the mere attractions and repulsions of different chemicals. When you see my actinian, you will declare that it thinks, that it acts intelligently, yet it is only a vegetable."

Mr. Smith was interested by the behavior of the actinian, and, thanking its owner, discouragedly took his leave,—not altogether without hope, for there was one more wise man to be interviewed, the celebrated divine, Soanso.

"I am heartily sorry for your misfortune," said Rev. Soanso, after hearing the story. "You certainly have no call

to regard it as a *visitation* of Providence in the sense of being punishment or malice, or anything of that sort. Nevertheless, it certainly was an act of God, for without Him nothing happens. I know nothing of physical forces, be they cyclones or what not, save as immediate manifestations of the omnipresent creative power of God,—the ever-present God without whom not a sparrow falls to the ground, for even the law of gravitation which causes the sparrow to fall is but an expression of a particular mode of Divine action. God is the source of matter. He is the source of what we call natural law, for the laws of nature did not exist always, but have arisen one after another in connection with the forms which have afforded the occasion for their manifestation. The Infinite and Eternal Power that is manifested in every pulsation of the universe is none other than the living God. But He is infinite,

we are finite. His ways are not our ways. They are as high above ours as the heavens are above the earth.

“What flight of analogy can bear us across the gulf that divides finite intelligence from that infinite knowledge to which *all things past and future are forever present*? The everlasting source of phenomena is none other than the Infinite Power that makes for righteousness. Thou canst not by searching find Him out, yet put thy trust in Him, and against thee the gates of hell shall not prevail, for there is neither wisdom nor understanding nor counsel against the Eternal.”

Mr. Smith listened very attentively. He was overwhelmed by this flow of eloquence when he took his leave, and thoughtfully wended his way back to the hotel. After awhile he paused and soliloquized thus: “He said I could not by searching find God. Now, before that

cyclone blew my books away I read in one of them that this did not mean in the original Hebrew a search such as I have been making, but a going about from place to place in hopes of seeing God. And he said that His ways were as high above men's ways as the heavens above the earth—that is Scripture, too; still, I understand that the heavens are not so high above the earth but that the astronomers have found out considerable about them after all, and if it's no higher than that, I don't see the force of the objection." Smith resumed his walk, but presently he came to another stop, and muttered: "He said that God makes the sparrows fall to the ground when they do fall; and he said that God knows everything that is going to happen, and makes it happen. Wish to goodness He'd deduct a few cyclones from His programme, even if it became necessary to fill out with more sparrows. Bosh!

that man does not know as much as I do."

Smith gave it up.

Let not the reader imagine that I have been putting words into the mouths of other men. The deliverances above attributed to the Materialist and Pantheist will be recognized as elementary tenets of those cults. Those of the Idealist are actual quotations from the writings of John Fiske.

CHAPTER XII

ETHICS AND NATURE

JAMES H. HYSLOP, Professor of Logic and Ethics in Columbia University, recently wrote an article that was published in the *International Journal of Ethics*, from which I quote as follows:

“The survival of the fittest shows that nature fails to accomplish any clear purpose for the individual apart from the lucky strong. We express the purpose as maintenance of the race, but as the race is nothing but a number of individuals the proper way to express it is to say that the purpose is the preservation of the strong and the destruction of the weak. This is the true statement of the facts, and it takes the whole ethical character out of the process.”

A religious newspaper approved Professor Hyslop's views, and said:

“Intelligence may be affirmed of a moral being, who has will and purpose and who manifests them in creation,—old-fashioned people call such a being God,—but no such intelligence is revealed on the part of nature,—only the operation of blind and unaided forces; and therefore a universe under the control alone of nature cannot properly be said to have a purpose, either as regards the universe or man.”

A secular newspaper at the same time commented as follows :

“If Professor Hyslop’s remarks could be forced deep into the minds of twenty or thirty American philosophers, we should hear less about the ‘ultimate benign purpose’ and ‘inherent moral intention’ of the evolutionary process, of which all that can be predicated is that it cruelly eliminates the weak, violently preserves the strong, and thereby produces certain effects which, if they are not controlled by a superior intelligence, can only be said to be blind. Even if it be granted that the final consequence of evolution will be for the benefit of human beings who happen then to be alive,—a circumstance which to us of the present generation is only remotely consolatory,—what logical

ground is there for speaking of that final consequence as a purpose for which we ought to feel grateful to the universe? Indubitably it can be spoken of as a result. But a blind purposeless result does not inspire gratitude, or trust, or faith, or any other emotion rightly connected with religion. Would not the cause of clear and honest thinking be subserved, therefore, if the men who do not believe in a superior controlling intelligence should drop their attempt to mitigate the loneliness of a purely scientific world by talking comfortably about a 'purpose' which is impossible except in connection with an intelligence which they deny?"

These utterances seem very significant to me. They come from the widely different stand-points of a college professor, a religious editor, and a secular editor. They all take the same view; namely, that there is no logical avoidance of choice between one or other of these two opinions:

1. We must give up the idea of God altogether; or,

2. If we adhere to a belief in God, then we cannot believe that nature fully reveals His character.

This is absolutely the sole alternative for those who will remain unsatisfied until their reason becomes reconciled to their belief. And this is a growing class everywhere,—in the pulpit as well as in other places. It is a class that is furnishing the foremost teachers of the world to-day.

About thirty-five hundred years ago it was written, that once upon a time Zophar asked Job, "Canst thou by searching find out God?" Humanity is still asking that question from the stand-point of Zophar and Job, both of whom assumed that God was fully responsible for all the evil which had befallen Job.

"Canst thou by searching find out God?" I answer that it is absolutely impossible to entertain an active sentiment toward any being without first

forming a mental conception of that being. A name is a mere abstraction. We cannot worship it unless we personify it as did the Gnostics: "In the beginning was the Logos" (the speaking voice), "and the Logos was God." The search for God will continue until the human reason is better satisfied than it has ever yet been.

And I do not mean a search for God's face, but for such evidences of His character and purpose as are to be found. Every one knows that a person's face may be familiar whose disposition is very little known. "By their works ye shall know them." By His works we shall know Him; but not if we believe that contemporary nature reveals Him. Nature exhibits to us two directly contradictory phenomena,—the existence of evil, and a constant decline of that evil, whereby it is gradually disappearing. If we compare the present earthquakes,

tempests, tides, and other disturbances of nature with those of the paleozoic age revealed by geology, we see a most striking change for the better. The existence of natural evil and its enormous decline upon our earth are two facts so utterly antagonistic to each other that the human reason instinctively recoils from ascribing both to the same intelligent design. The decline of natural evil does not suggest an author of it, but a successful opponent. If God be its author, who is its opponent? If God be its opponent, how came it to exist? Let us look for the character of God in what we must all agree is assuredly His work,—in the good that is gradually supplanting the evil, and we shall be better prepared to search out the cause of evil. Let us no longer run counter to logic and reason by assuming that the search for God and the search for evil are the same.

Nature reveals two things to us: Good and Evil. Let us cease attempting to trace these to one source. Let us return from the Realm of the Impossible to the goodly, and Godly, Kingdom of Common Sense.

There is an ethical purpose revealed *in* nature, but it has no appearance of being a purpose proceeding from nature. Nature exhibits to us a series of blind purposeless energies and atoms, nothing more. But the history of nature reveals more than this, for it reveals a tendency toward good and away from evil,—away from all sorts of evil,—natural and moral. The very fact that evolution has produced a race whose present ethical notions demand the preservation of the weak, shows that if we compare the present, or any other period, with some remote past, and observe what has occurred meantime, we shall have before us a *history* that confounds all attempts

to spell out a final purpose from what is exhibited to us during our own brief lives. We shall see that this purpose had a longer reach than the preservation of the physically strong, when that was the highest ideal. That is an ethical idea which belongs only to brutes and savages of the lowest order. It no longer rules man. It is intellectual strength that counts most in the struggle for existence. This also is only a step, as the former was. It indicates a change of method, but, of itself, it discloses no ethical purpose, for the physically weak man, who overcomes the physically strong man by reason of superior intelligence, may be, and often is, more cruel than the most relentless savage. There yet remains a vista in the ethical highway. There is a beyond,—that beyond in which Jesus travelled, and whither He beckoned us. And many have gone therein, and more and more follow. The advent

of just such souls as Professor Hyslop, and the constantly increasing number of them, demanding an ethics which shall protect the weak, is proof that God is still "in His heaven," slowly but surely working out His beneficent purposes, ever and ever supplanting that which was with that which is higher and better. Let us not make such a foolish mistake as to suppose that a Being who is doing this—supplanting evil with good—would delay the work unnecessarily, would adopt a slow process if He had the choice of a speedy one. Let us keep in mind that it is things, *i.e.*, realities, truths, that are possible to God. Let us not forget that what is *made* can never become infinite in quantity, and that, therefore, what is infinite in quantity cannot have been made, but must be eternal and self-existent. Therefore let us not accuse God of having brought into existence the materials out of which nature has been

evolved. Those materials are infinite, eternal, and the properties they possess are therefore innate ; for, as an infinite mass cannot be made, so, for the same reason, it cannot be endowed.

CHAPTER XIII

TWICE NOTHING IS NOTHING

THE essence of all that exists, or ever did exist, in finite form, whether that essence be matter, life, energy, mentality, or spirit, must have existed before as a finite part of an infinite source of supply. Things can be made, that is, *formed*; but there must previously exist that from which they were made; for a thing cannot be made from nothing in a universe where Truth exists. We must learn to distinguish things, forms, individuals, finites of all sorts, and of all manner of compounding, from those primal elements out of which they have been fashioned,—matter, energy, mentality, life, spirit; for if the quantity of these be finite there must assuredly be an end to creation, as time is eternal, and any work begun with a

finite source of supply must inevitably end some time for want of the wherewithal to continue ; unless it proceed thereafter by reducing what has been made back to the original condition and beginning to make it over again, and this would be mere child's play if it were to go on interminably, as it must do, or end.

The common mind of humanity, when it is not impelled by what we call intuition, moves along the lines of least resistance, and thus adopts beliefs which belie the evidence of the senses, or are opposed to the individual's reason. Thus we adopt many of our opinions through the mere *habit* of hearing others express them, or from reading books. Sometimes we are led into error and sometimes to the truth in this way. Civilized people now believe that the earth revolves upon its axis ; uncivilized people believe the evidence of their eyes,—that the sun

moves around the earth. But it took no little time for the truth to receive common acceptance after it was announced ; and it came to be believed generally, not from a general knowledge of the reasons which lead up to it, but, one by one, men came to admit it because some one else did in whom they had confidence, or because "everybody says so," as the saying is. "Everybody says so" is and has always been one of the most potent causes in spreading both truth and error, and it has ever been the most invulnerable chain that has bound humanity to superstition and unreason, for it depends not upon reason, but upon habit.

In this way the absurdity that all we see—planets and everything thereon, and the multitude of suns—came from nothing ; a chimera born in the credulous fancy of primitive man still lives and thrives in every-day theology. But twice

nothing is nothing, and a billion times nothing is no more, for what is truth once is truth always, and what is truth in one place is truth everywhere, and as multiplication will not now serve to increase nothing into something, we may be sure there never was a time when it could be done, for the truths of mathematics are of God, as is all truth.

CHAPTER XIV

A STATEMENT OF THE QUESTION

THE history of nature impresses us with a wonderful system of orderly development, resulting in the myriad forms of vegetable and animal life which we see about us. Looking at what it has come to be, we find no language adequate to express our admiration. At the head of all, and most marvellous of all, stands Man, a composite being, made up of Time, Space, Matter, Life, Energy, Mind, Spirit, Love, Hate, Truth, Falsehood, and all infinite essences both good and evil. We turn from these earthly phenomena to the lesser but more ponderous and impressive marvels of stellar space with its teeming multitudes of burning suns, suggesting the probability of many other planets upon which the

wonders of our own earth have been or are being duplicated. We naturally think of these things as having been *made*. We know they are not made as we make things, quickly, but that they have reached their present characteristics through what seems to us a very slow process of evolution. Evolution from what? The kernel lies in this question.

Did God, before He began this evolutionary process whereby these things have all been made, or whereby they are in process of making, bring into existence that out of which they have been evolved?

Let us take matter to begin with. The qualities or properties of matter are the direct causes of all natural evil, and we have no knowledge of any other cause. As an instance fresh in all our minds, take the recent eruption of the Pelée volcano in the French West Indies, causing the destruction in a few moments of

all the inhabitants of a good-sized city. It was caused by the explosive and heat-producing energies of matter stored up in the bowels of the earth. We all recognize that as the *proximate* cause of a human holocaust which shocked the sensibilities of all civilized people. So far all will agree,—the properties of matter constituted the immediate causes of the calamity. But suppose it allowable to suggest a remote cause of it, the cause that endowed matter with properties. I am at least entitled to say that when we make that sort of suggestion we are entering the realm of conjecture. No one will deny that. We know that the properties of matter were the direct cause of the evil, and we guess that there is a cause still farther back, a cause responsible for the properties of matter.

I have, then, to argue against conjecture, and I shall oppose it with facts and with reason. It ought not to be difficult

to overcome conjecture with such weapons.

If any human being wantonly destroyed a single life, to say nothing of so many, and in such a horribly cruel manner as by burning, we could only have one opinion as to his character. When evil is observed, a natural and highly ethical desire implanted in the human mind impels us to find *some one* on whom to lay the blame. And this detective impulse is so strong that we seem compelled to attribute evil to spiritual agencies, where no other cause can be found.

I have now open before me a book which states that 13,000,000 would be a fair estimate of the number of people who have perished from earthquakes during the historic period. Truly, if we assume that this killing was all done purposely, there is a pretty big indictment against somebody. And yet there must be other and more shocking counts

in this indictment; for the number who have perished by storms and lightning is still greater, many times greater. And if we should go back a few hundred thousand years to primitive man, and follow up the trail of death directly due to these natural causes, we should no doubt have a sum total greater than the present population of the earth. Put them all in the indictment; we might as well make one job of it.

But we are not ready to draw the indictment, for we have not found the doer of all this evil. We must make some inquiry. We ask the "Tom, Dick, and Harry" of Idealism and Theology their opinion, and they all reverently answer that it is God, and that we must not blame Him, as His ways are past finding out, and His purposes must be assumed to be wise, merciful, and just in the long run. I should be compelled to make some such answer myself did I not be-

lieve the suggestion that God is the cause of all these evils to be mere conjecture, and a survival of an idea that has come down to us from the babyhood of the human race. Is it possible for us to cast off this old superstition that has had a lodging-place in human thought for perhaps a hundred thousand years,—the idea that natural evil is due to spiritual causes? We have advanced somewhat, indeed quite a way, in the direction of getting rid of it. We used to think that spiritual agencies were the *direct* causes of those evils. It was only yesterday, as it were, that the learned Greeks pictured Zeus as sitting on the top of Olympus and hurling his thunder-bolts at people; while Æolus pursued with windy vengeance those who went down to the sea in ships. Civilized man no longer regards these calamities as the direct acts of God. He knows that the direct causes of them exist in

nature, but he conjectures all the same that God put those causes into nature.

Thus the old idea still hangs onto our minds, with a weakened grasp, it may be, but there it is. Shall we ever get rid of it? I trust we may. We certainly shall if we go at it in the right way.

CHAPTER XV

FACTS VERSUS CONJECTURE

How does this conjecture, that God caused evil, fare with the facts? What are the facts? Who can thoughtfully observe the wonderful evolution of the material universe extending backward during countless ages without believing that God's purposes are serious,—that He does not form things merely to destroy them afterwards? Who can consider the fact of the steady decline of natural evil, and not be convinced that God is opposed to it? Who can compare natural accidents to the prevailing order of nature, and attribute both to the same intelligent purpose? God's methods, as shown in almost all the phenomena of nature, from planets, with their orbital and axial motions, up

through all the various stages and forms of vegetable and animal life, are orderly and progressive. In appearance, this class of phenomena, constituting the almost invariable rule of nature, differs so radically from such a thing as an earthquake, a tornado or a thunder-bolt, that reason recoils from suspecting both to have the same origin. The class of phenomena which commend themselves to our consciousness as being good are assuredly the rule. Those which are evidently evil happen so very seldom, as compared with the others, that they must be looked upon as rare exceptions.

From the monera to man is a prodigious stride; and will any one say that it does not betoken a Creator who is good and wise, and has a serious purpose? Does the tornado suggest wisdom or goodness?

If we follow the history of moral ideas we shall find the same ever-increasing

prevalence of the good, and disappearance of evil. As our ethical standard mounts higher, century by century, we may find as much, and even more, fault with evil as did the reformers of old with the evil of their own day ; but we know, nevertheless, that there has been a change for the better among civilized nations in the attitude of the public toward the old evils that we still have with us, as well as in the disappearance of many and great evils which were once common, in war, in law, in government, in society, and in the home. Vice no longer vaunts itself as of old ; we no longer tolerate piracy, slavery, polygamy, despotism, the sack of cities, the slaughter of prisoners or defenceless people. We have abandoned the dungeon. The father no longer has the legal right of the Roman to kill his children. Had a certain general, who commanded his soldiers to "kill all over ten years of age,"

lived two thousand years ago, history might have written him down a hero, with Marius, Sylla and Julius the first Cæsar, but he lived in our day, in the United States, and was court-martialed.

Thus the disclosures of geology and the lessons of human history prove that both in the physical world and in society there has been a pervading and constant increase of harmony in nature, and peace and good-will among men. These are the evidences of God's benevolent purposes. Let us, therefore, follow the simple dictates of reason and common-sense, here, as in other matters, and look outside of rather than in the nature of such a Being for the existence of those natural and moral evils which are gradually disappearing from the world as a result of His opposition to them.

"Canst thou by searching find out God?" Let the same Scripture answer: "My son: if thou seek him, he will be

found of thee." (1 Chron. xxviii. 9.)
"Prepare thy heart to seek God."
(2 Chron. xix. 3.) "With my spirit
within me will I seek thee." (Isaiah
xxvi. 9.) "And ye shall seek me and
find me when ye shall search for me
with all your heart." (Jer. xxix. 13.)
"Seek ye first the Kingdom of God and
his righteousness." (Matt. vi. 33.)

Let Science answer: Long ago and
during a period counted by hundreds of
thousands of years, while the earth's
crust was forming, there was a contin-
uous reign of storm. And what a storm!
Professor Mitchell, in "Walks and Talks
in the Geological Field," says:

"Here, in this storm of the ages, the dazzling
glare of ten thousand lightning gleams sheds an
infernal tinge over the murky world; and the re-
sponsive voices of ten thousand thunders split the
welkin with their detonations. While this fury
and chaos reign, the line of battle sinks to the hot
surface of the earth, and all at once the attacking

waters are volatilized in ten thousand explosions, which rend the elements. Imagination, even, shrinks from the contemplation of the scene."

Æons after the beginning of that storm the sun at last pierced a rift through the clouds and shone for the first time upon a world whose thin crust was covered with boiling water, save for such transient peaks as storm and tide, now and then, jammed and thrust upward for presage of what was yet to come. "And it was evening, and it was morning ; first day."

Who said, "Let there be light" ?

Æons passed while struggling ridges of land were upheaved only to be again washed away by mighty tides and deluges of water cast upon the land through internal forces of heat, and explosive energies, everywhere upheaving the ocean bed. The struggle of the elements continued in cyclonic storms and hurricanes of magnitude beyond human conception,

and the chaos was heightened by the never-ceasing war between land and sea.

Æons passed again, and the northern part of North America, the Adirondacks, Appalachians, Cordilleras, Rockies, and Californian mountain-ranges withstood the shock of the enormous waves and mighty tides that pounded against them, and then the shores, once having obtained a firm foothold, began to grow, and land animals reinforced the life that had already existed for ages in the ocean.

More æons passed and man appeared, primitive, savage, weak, compared with many other animals, yet by superior intellect lord of the animal kingdom and able to defend himself successfully against the strong. The age of the survival of the physically strong was passing away. The reign of primeval storm and tide, of continental upheavals and submersions had long ceased. The world had grown better. ' Natural evil, once domi-

nant, had become an outcast vagabond, showing its face but rarely, when the earth received her king.

Let History answer: That king to whose efforts the further progress of peace and good-will were now entrusted, slowly but surely, under the guidance of a Divine, ethical impulse planted within his mind, has been and is accomplishing the trust. We began our brief history with a picture of a primeval storm raging uninterruptedly over the face of the earth during æons of time, ages of darkness when clouds of black vapor from a boiling ocean enveloped the planet to the height of hundreds of miles, when life of any sort, to say nothing of comfortable existence, was impossible. We close it with a smiling world so beautiful that the poet's pen struggles ineffectually to describe it; a world in which, although there still remains some misery, there is such a vast preponder-

ance of happiness that very few indeed of its denizens desire to quit it ; a world beginning to teem with books and schools, churches and charitable institutions ; a world whose ideals are higher than its achievements ; a world into which Jesus came, to go about doing good, and to bring a message of peace and good-will ; a world which has, haltingly, but nevertheless surely, shown that it is going to follow "the Way, the Truth, and the Life" more and more as the centuries are counted ; a world which is producing many sensitive and impatient souls who, dissatisfied with what they can do or see done during their own brief lives, are inclined to criticise the element of tardiness in human progress, and even wonder why an all-wise and benevolent God has performed His good work so slowly.

Such are the answers of the Bible, of Science, and of History, to Zophar's

question : “ Canst thou by searching find out God ? ”

Who is responsible for supplanting that primeval storm with the beauty of nature and the happiness, prosperity and love which now exist upon earth ? Is not this the right point from which to begin our inquiry as to the cause of evil, rather than from the stand-point of evil itself ? How, then, did the evil come ? But wait ; let us be logical, let us dispose of one question before we pass to the next. The question now is, having sought God and found His character for love and goodness and wisdom to be proven in the best way possible,—that is, by His works,—must we not at least look elsewhere for the source of evil ?

CHAPTER XVI

SUMMING UP THE ARGUMENT

WE have seen that there is a realm of the absolutely impossible wherein even Omnipotence is powerless for the reason that what is infinite or absolute, or self-existent, cannot be destroyed or changed into its opposite.

Did God bring into existence, out of nothing, the materials from which He formed the planets? Clearly, if He did, He had the choice of materials, and being, as He evidently is, opposed to natural evil, His desire must have been to produce materials from which planets could be made without the collateral result of natural evil. But as the evil exists, and as its gradual eradication in the past shows that He is opposed to it, and as it evidently arises from the prop-

erties of matter, we are forced to choose between two conclusions : either that He made a mistake in producing matter, or that He did not produce it at all. It seems to me that the natural evidences of God's wisdom are too many and wonderful to permit the supposition that He fell into a mistake. Besides, if He could produce matter from nothing, He could at any moment change its nature, or destroy it and replace it, and so correct the error.

If, then, God did not bring primary matter into existence, He must have been confronted from the first with any evil which inhered either in matter itself or in its original condition. There was evil in that condition, for it was certainly unproductive. God determined to conquer this all-pervading evil ; to change this useless mass into happy worlds. In the nature of things there can be but *one right way* to do any given

work ; every other way must have a modicum of error, more or less. Two ways to produce the same exact effect is an utter impossibility. There was only one *best* way in which planets, fit for His purpose, could be formed from the existing materials. He had a purpose beyond the mere formation of planets ; and it does not seem difficult to believe that the form and texture of planets adopted, is better suited to the designed purpose than any other of which the materials were capable ; nor to believe that the growing harmony and happiness of our own planet indicates that His purpose was wise and benevolent.

Moreover it seems clear from a study of nature that, so far as the material universe is concerned, the work of God has been, and is, to organize matter, give it form, develop it, advance its condition, make it productive of good. Geology teaches us that such has been His

work upon this planet for untold ages. Astronomy reveals to us a like work in other portions of space. Upon the earth which we inhabit, and in the firmament of stars, He has written plainly the fact that He is still at work. Think of it well. God at work! Something that He did not do until to-day. Something that He will begin to-morrow. Our own solar system shows us planets in various stages of formation. If we look farther we see in the nebulæ what seem to be still younger systems, where His work has more recently begun. And still farther beyond we reach the infinite storehouse of untouched matter, which is to be considered hereafter in connection with the subject of a Finite Universe.

We may briefly sum up the results of our inquiry thus: God is apparently the enemy of natural evil, because He has been continually removing it. As this fact is inconsistent with the supposition

that He brought the evil into existence we should look elsewhere for its cause. We find the *immediate* cause in the properties of matter. If matter is self-existent, this immediate cause is also necessarily the primary cause. But if the Maker brought matter into existence from nothing, then He is the cause, and we can explain His opposition to natural evil only upon the theory of mistake in producing matter and endowing it with its properties. That theory is inadmissible, because, first, His works show Him to be a supremely wise Being who could hardly fall into such a fundamental error ; and, second, a Being who could produce matter from nothing would, if He found the production faulty, immediately reduce it back to nothing and replace it with other and faultless material. These considerations, added to the utter absurdity of the proposition that something can be produced from nothing, lead us to the

conclusion that matter in its primary condition was self-existent, and so it must be the primary cause, as it is the immediate cause, of natural evil. We would, from this stand-point, be led to expect the Maker's real work in nature to be just what we find in the history of the progress of nature as shown by geology and astronomy,—namely, a gradual and continuous evolution and improvement of the condition of matter,—a work as infinite as space, as ceaseless as eternity.

The easily discerned lesson of nature is this,—that wherever the hand of the Maker reaches, there the certain promise is made of an ultimate reign of happiness and love. The long ages of gradual improvement warrant this conclusion. If there be now, or at any time, upon this planet, some remnant of disorder which God has not removed, it only shows that there are yet a few places and conditions where His good work is unfinished.

The development and improvement of an infinite quantity of matter is an infinite work. It cannot be comprised within a moment, a day, a year, a million years, nor within any finite period however great. The finite can never contain the infinite. That is one of God's truths, and He, therefore, cannot violate it by completing His infinite task at any time. It must ever go on. It will always grow better, but never be finished. This planet is like all His works, a growth, an evolution from a condition of uselessness to one of usefulness. The first condition of matter was not, and, as we have seen, could not be of His making. Nor can any remnants of that condition be ascribed to Him. The growth is His. The order and harmony are His. He alone made human life possible upon this planet. If at present our bodies are not absolutely secure ; if we occasionally receive disease, injury, or death from the

material elements without our fault, let us remember that once we could not have existed here at all. Then instead of blaming the Maker for what He has not yet finished, for not making something out of nothing, for not changing matter into intelligent love, we may learn to thank Him for what He has done and for that earnest of what He intends yet to do in the improvement of nature, and we may rest secure in the faith that as fast as material elements can in any possible way be controlled and brought into subjection to law, He will continue, as in the past, to relieve His creatures from all physical dangers against which they are unable to protect themselves.

CHAPTER XVII

CONCLUSION

THE idea that we must not look to God as the source of evil is not original with me, though I have produced several arguments in support of it that I have not met with before.

John Fiske says in "The Idea of God," page 124 :

"Among the profoundest thinkers of the Aryan race there have been two who have explicitly adopted the solution which limits the Creator's power. One of these was Plato, who held that God's perfect goodness had been partially thwarted by the intractableness of the materials he had to work with. . . . The other great thinker who adopted a similar solution was Leibnitz. In his famous theory of optimism the world is by no means represented as perfect; it is only the best of all possible worlds, the best the

Creator could make out of the materials at hand. In recent times Mr. Mill shows a marked preference for this view, and one of the foremost religious teachers now living, Dr. Martineau, falls into a parallel line of thinking in his suggestion that the primary qualities of matter constitute a 'datum objective to God,' who, 'in shaping the orbits out of immensity, and determining seasons out of eternity, could but follow the laws of curvature, measure, and proportion.' "

I respectfully submit that the stone offered by Plato and Leibnitz, Mill and Martineau, though hitherto rejected by the builders, must become the cornerstone of that temple of Theology which shall endure forever as a place for the worship of an all-wise and all-powerful God of Love, who doeth all things well, who abideth in Reason and Truth, and with the Everlasting Realities, and so doeth only things, speaketh only truths, and dealeth not with chimerical absurdities, but with the eternal actualities of

Good, Evil, Time, Space, Spirit, Mind, Life, Energy, Motion, Matter ; who is the personification of Love, Truth, and Goodness, and has ever abhorred evil in all its forms.

I have less respect for the wisdom than for the ingenuity of that class of casuists who affirm that nothing can exist apart from consciousness. If the earth were devoid of any form possessing conscious intelligence it could still exist with its myriad vegetable and mineral forms ready for cognition by the first one that should come into existence upon it, as it did for untold ages before the advent upon it of any form of conscious intellect. In other words, matter is an absolute entity and not a mere creature of imagination which in an inconceivable way reveals its manifold forms in precisely the same shape to each of earth's inhabitants, when first seen, and wherever seen, exhibiting an unaccountable multitude of coincidences

that carries us far beyond the limits of the possible.

Having, as I trust, changed the direction of the quest for evil away from its opponent, God, it is not my purpose here to search for its explanation farther. Of this we are assured,—that God is not its author. Therefore, if we look further let us begin to look elsewhere. For myself, I am satisfied when I know that God is its enemy. Let us “come to the help of the Lord against the Mighty,”—the hosts of evil, for to that end I believe we have been brought into being.

Monism is a *misnomer*. It is a bad form of dualism. It increases difficulties, instead of removing them. When it assumes the phase of Pantheism it gives us a God who unites within Himself two irreconcilable enemies,—good and evil. Is a house divided against itself Monism? It is the Pantheist, not I, who limits the power of God. Of what use is power

unless there be some obstacle to overcome? Pantheism does not deny the existence of obstacles, but it places them in the nature of God instead of outside Him. The difference between Good and Evil cannot be eradicated by bringing them together, whether the place of meeting be in the nature of a supposed God, or elsewhere in the illimitable realm of Chimera. When Good is Evil, when Love is Hate, when Light is Darkness, when Power is Impotence, when Intelligence is Ignorance, when Sciolism is Philosophy, when all sorts of opposites are alike, then we shall have Pantheism, and therefore we shall have nothing; for Pantheism is the sum-total of all self-contradictions and self-destructive conceptions.

PART II

A FINITE UNIVERSE

“Great is our Lord, and of great power : his understanding is infinite.” — *Psalms* cxlvii. 5

CHAPTER I

What is the sky?—The author's views sent to *Popular Astronomy* in 1894; synopsis thereof published; comments of the editor—Herschel, Tyndall, Wallace, and Spring agree that its color proves the sky to be matter of some sort.

WHAT is the sky? Is it not, when we really think about it, a most wonderful and striking phenomenon? At the birth of the human race infants saw it, accepted it unquestioningly, as they accepted light, air, heat, cold. Until very recently, man passed from the cradle to the grave with little thought or question about those things which were always with him,—those phenomena which never ceased. Though we know, now, that Newton was not the first to ask, Why do the apples fall?—that the question was asked more than two thousand years

ago, by observing men,—we also know that Newton was the first to give a demonstrable answer. It was only yesterday that Science bethought itself to ask, “What is heat, light, air?” Yet these have ever been absolutely essential to our existence, and ever present with us. How many have asked, “What is the sky?”

One day, a good many years ago, the sky, which since childhood I had been looking at with no awakening of curiosity, presented itself to my thought as the most wonderful and striking phenomenon in all Nature. What is it? Where is it? Is it something? Is it nothing? These questions became ever present with me. I had recourse to books and found that the question had been asked before, and very recently, by John Herschel and by John Tyndall. But their attempted solution of the riddle seemed unsatisfactory. They left at least one important

and perfectly obvious fact unaccounted for. They attributed the *color* of the sky to the light of the sun shining upon rarefied dust in the upper region of our atmosphere. But the sky is blue at night when the sun does not shine upon that dust; and we can see the stars as we could not if such a blue substance intervened. In 1894 I sent to the editor of *Popular Astronomy* an article in which, after some introductory statements, the following conclusion and argument were set forth:

“ 1. The sky is beyond the stars.

“ 2. The sky is matter of some sort.

“ 3. The sky is probably an infinite depth of gas surrounding the sidereal system, and composed of the same material elements from which the stars and planets were evolved.

“The facts which appear to prove the first of these propositions, viz., that the sky is beyond the stars, are as follows: 1. The sky has color; 2. The blue of the sky becomes intensified to the eye when observed from the tops of mountains, or in

elevated regions, where there is scarcity of vapor and rarity of atmosphere ; 3. The blue of the sky does not intercept, or impair, the light of the stars. The light of the stars is not blue as if it came through a blue medium. Any substance, capable of color, and occupying the space between us and the stars in sufficient quantity to look as blue as the sky, must have such density in the line of vision that it would either shut out the light of the stars altogether, as a blue cloud would do, or at least seem to do so, by permitting none but blue rays to come to us. The fact that the spectrum of a star's light discloses all the rays, conclusively proves that this intensely blue thing which we call sky is not between us and the stars.

“The conclusion that the sky is matter of some sort seems to be a necessary deduction from the fact that it has color. Color is the result of the coming together of matter and light-waves. Color has never yet been found separated from matter.

“If the sky is matter of some sort, and is beyond the stars, the inquiry naturally presents itself: Why is not the matter composing the sky within the sidereal system, as well as beyond it? And the most reasonable theory to suggest as an answer seems to be that the sky is composed of

the same gaseous elements from which the planets and stars have been evolved, and so we cannot expect to find it within the space occupied by the stars, except as we find it solidified or condensed into planets or stars, or nebulæ.

“The theory that the process of star making is going on every day is not only consistent with the law of evolution, but, if we reflect, we shall find it to be a necessary corollary of that law. It also receives material support from many observed facts which I need not mention. But that theory cannot stand for a moment save upon the hypothesis that there exists in space the material from which new stars can be evolved.

“Looking upon the sky as unorganized or unformed matter, what solemn and awe-inspiring thoughts crowd upon us! The workshop of the Almighty! The material for myriads of future stars lies there undisturbed. That which, ages hence, in God's good time, shall, through His Divine Laws, become evolved into the material bodies of countless beings whose planetary abodes are not yet in embryo, there awaits His Divine art and quickening breath. So did the elements of these bodies of ours, ages upon ages ago, when, perhaps, intelligent creatures, inhabiting older

systems, looking hitherward upon the gaseous matter from which our solar system was afterwards formed, asked themselves, 'What is the sky?'

"And is not the sky, thus considered, an indispensable fact without which creation past cannot be accounted for, nor creation future expected? Is it not essential to the best approved theory of material evolution that there should be an infinite storehouse of unused material existing outside of organized matter, . . . raw material awaiting the hand of the Divine Artificer to mould and fashion it into stars; the sidereal system's atmosphere, which, however much may be taken from it and added to the living world, must, by reason of the infinity of space which it fills, ever remain an envelope that will eternally reflect and conserve light, heat, and all the energies expended within the sidereal system?"

The editor of *Popular Astronomy* was kind enough to say some complimentary things about this article in a letter to me, and I had reason to expect its publication, but after waiting a few months I found in the magazine, under the head of "Practical Suggestions," the follow-

ing (*Popular Astronomy*, volume iii., page 329, March, 1895) :

“What is the sky? . . . T. C. R.

“Recently we received a full and well-written letter from a person who evidently knows how to think, and how to express his thoughts in writing. Having given his attention somewhat to the above query he believed he had reached some conclusions which were based on sound reasoning. The first was that the sky is beyond the stars. The facts which appear to prove this are three, viz. :

“1. The sky has color. 2. The blue of the sky becomes intensified when observed from the tops of mountains, or in elevated regions where there is scarcity of vapor and rarity of atmosphere. 3. The blue of the sky does not intercept or impair the light of the stars.”

Upon page 230 of the volume referred to, the editor makes some comments upon my theory as follows :

“The conclusion that the sky is beyond the stars, reached by our correspondent, must mean that the source of the blue of the sky is beyond the

stars. The fact that the blue of the sky is intensified, for instance, when observed from the tops of mountains, rather supports the idea that the blue color is an atmospheric phenomenon, rather than one produced in the far-off starspaces. Again we cannot certainly affirm that light does not lose something or is not in some way changed in passing through the vast depths of ethereal space."

I was puzzled by the reference to my article as "a full and well-written letter." I had written a letter and enclosed it with the article, but it contained only a brief skeleton of the main points, without any repetition of the argument contained in the article, some of the strongest features of which were entirely omitted from the foregoing mention of my "letter." I wrote to the editor, and received an answer saying that my article had been submitted to two scientists, and that as they did not approve my theory of the sky he had not published it. I requested the return of the article,

and the editor replied again that he had submitted it to the two scientists, whose names he had not given me. From this I concluded that probably the article was not in his possession, and that when he published the foregoing meagre sketch he had nothing to remind him of the argument set forth in it, but such brief reference as was contained in my letter. I did not really care about the article, as I had copies of it, and that "closed the incident." But I felt thankful to Mr. Payne, that having disclosed the article to persons unknown to me, he had taken pains to preserve in his magazine evidence that would at any time, if it ever became necessary, enable me to establish my claim as the originator of the idea that the sky is an envelope of gas or other primary matter surrounding the sidereal system ; for, having full faith in that theory, I felt then, as I do yet, that in time it would be accepted by

scientific men as my own mite of a contribution to the stupendous edifice of science which is being erected by them.

Two celebrated scientists, Wallace of England and Spring of Belgium, have recently devoted considerable attention to the fact that the sky has color, and deal with this fact, as it should be dealt with, at least so far as to assume that it could not have color unless it is something. See "Man's Place in the Universe," Wallace, pages 247 to 253. But Mr. Wallace, like all others, so far as I know what others have said, overlooks the important fact that this color interposes no obstacle to our vision of the stars. That point was tersely stated in the note credited to me in the magazine *Popular Astronomy*: "The blue of the sky does not intercept or impair the light of the stars." This it would certainly do if it were between us and the stars. But it seems to me that my

theory of the sky has received strong support within the last few years from the opinions of astronomers upon a closely related question, viz., the absolute persistence, and indestructibility of light-waves in ether space, from which physicists necessarily infer that if all matter in the infinity of space has been developed into stars and nebulæ, then, as one writer expresses it, "the sky would be ablaze night and day and we could distinguish the sun only as a rather yellowish disk." Now if the infinite mass of matter has not been so developed into suns, *i.e.*, stars, as to make the heavens one blaze of light, where and what is that portion of it which has not so been converted? Having thus briefly outlined my theory, and the argument in support of it, I shall endeavor in subsequent chapters to answer the arguments adduced in support of the two other theories thus far advanced.

And, at the same time, I will make the reader acquainted with such recent discoveries in the realm of Astro-physics as appear to lend support to my own views concerning that wonderful and beautiful phenomenon, the blue sky.

CHAPTER II

The components of the color of the sky,—matter and light—Where is the matter?—Whence the light,—from our sun, or from the distant suns?—The Herschel theory and Tyndall's experiment ; a bottle of sky—The impregnable wall of the sidereal city—Spring's criticism of Tyndall's experiment ; the oxygen theory.

THE editor of *Popular Astronomy* began his comment upon my theory of the sky by saying: "The conclusion that the sky is beyond the stars reached by our correspondent, must mean that the source of the blue of the sky is beyond the stars." My article stated that "color is the result of the coming together of matter and light-waves ; color has never yet been found separated from matter." The source of the blue therefore was matter and light. I suggested that the matter was beyond the stars, but my

article did not state what I thought as to the source of the other element of the color,—light. It had not occurred to me that there could be any other possible source than the sidereal universe of suns. But I must infer from the above comment that the editor of *Popular Astronomy* thought I located both ingredients of the color—matter and light—beyond the stars. I did not think so then, nor do I now. The idea is almost inconceivable, and is entirely unneeded to account for the light that would aid in producing the color effects, as the stars would furnish that. The light-waves from these millions of shining suns radiate toward the sky-envelope in all directions. The farther they are from us the brighter they shine there, and, as stellar evolution is in actual progress there, millions of bright suns are near enough to shine upon it with far stronger light than any star in the heavens brings to us. Our own sun,

which seems to be fairly near the centre of the stars, would furnish no appreciable part of the light that gives us that far distant sky.

The editor of *Popular Astronomy* then made this further comment: "The fact that the blue of the sky is intensified, for instance, when observed from the tops of mountains, rather supports the idea that the blue color is an atmospheric phenomenon rather than one produced in the far-off star spaces." Now this is hardly the case. The fact is that this intensification of the color of the sky, as seen from the tops of mountains, is consistent with either of the two theories; standing alone, it does not support one any more than the other. But taken in connection with the other fact mentioned in my article, that we can, notwithstanding this increasing intensity of the blue, see the stars plainer, proves that, whatever it is, it must be beyond them.

If it were, for instance, a cloud in our atmosphere or elsewhere in space, the more intense the color, the more effective the veil it would interpose between the eyes and all objects beyond itself.

The suggestion that the blue of the sky is an atmospheric phenomenon was, so far as I can discover, first made by Sir John Herschel, who died the same year that Tyndall's "Fragments of Science" was first published in the United States by D. Appleton & Co., 1871. In that book Tyndall has a lecture on "Chemical Rays, and the Structure and Light of the Sky," which is, in the book, prefaced by a page of quotation from Herschel setting forth the latter's views on this subject of the blue color of the sky ; and the lecture is an effort to show that this is caused by very small particles of dust in our upper atmosphere, and the light of the sun reflected from them.

Tyndall's experiment, whereby he at-

tempted to prove this, can be understood from reading the lecture above referred to, but apparently the fact that he was aided in explaining it to his hearers, by apparatus upon the lecture stage, prevented him from being as clear in statement as if he had been writing a book. Therefore, instead of trying to convey an idea of his experiment by quoting from his lecture, I will give a clearer and simpler statement of it from Wallace's book, "Man's Place in the Universe," page 248.

"If a glass cylinder, several feet long, is filled with pure air from which all solid particles have been removed by filtering and passing over red-hot platinum wires, and a ray of electric light is passed through it, the interior, when viewed laterally, appears quite dark, the light passing through in a straight line and not illuminating the air. But if a little more air is passed through the filter, but so rapidly as to allow the minutest particles of dust to enter with it, the vessel becomes gradually filled with a blue haze, which gradually deepens

into a beautiful blue, comparable with that of the sky."

This description lacks some portions of the experiment described by Tyndall, which requires an air-pump to be used in changing the air in the tube. It appears also from Tyndall's statement, p. 355, that the blue color in the tube is transitory,—soon passes away, and the cloud changes to "whitish blue." In that important respect it seems to very imperfectly represent the sky, the color of which is absolutely persistent everywhere and at all times when there are no clouds to hinder seeing it. However, this loss of color might arise from precipitation of the dust, and so, let us suppose the dust to be kept in a constant state of agitation, or that, from any cause, the color in the tube becomes a permanent thing :—Is this question disposed of by simply showing that the color of sky-blue can be produced thus? Wallace

refers to it as a "haze," and Tyndall constantly refers to it as a "cloud,"—at first a white cloud: pages 247 to 253. We often see white clouds in the heavens. They shut what lies beyond them from our sight. We also see blue clouds and red ones,—none of them are transparent. Here is the *Crux* of the Tyndall theory. How are we going to see the stars, sun and moon through a blue sky-cloud hung above us in our own atmosphere? We do see sun, moon, and stars; and does not this fact compel us to reject the theory that they lie beyond the sky? The two elements of Tyndall's sky-cloud *can* exist beyond the stars, as well as in our atmosphere. The matter may be there as well as it may be here. The light is certainly there,—the starlight. Both elements may also be in our atmosphere,—the attenuated matter may be floating there. The light is certainly there,—sunlight by day, starlight by night. So

far Tyndall's theory is just as good as mine, for we each conjecture the matter, and assign it to different places, and we know that the light is in each of these places. But the trouble with Tyndall's explanation is that it puts this blue sky-cloud in a place where it cannot be, because we can see the stars, which we could not do if the sky was where he supposed it to be, and we are driven to the other and only alternative—that the sky is beyond the stars,—the raw material for the making of future suns and worlds ; the impregnable wall of the sidereal city, through which nothing from within can escape, nothing from without break in. There may be other systems of suns and worlds in other parts of infinite space, but if one of these "outlanders" should break from its mooring we need not fear it. The little meteor igniting in our outer atmosphere and turning to gas, gives good assurance of

what would happen to such stray sun. It would only serve to enlarge our gaseous bulwark by plunging into it.

Professor Spring, on the other hand, in a lecture devoted to this question, which he delivered before the Helvetic Society of Natural Sciences, in 1904, criticises Tyndall's experiment. From an abstract of this lecture, published in the *Revue Scientifique*, the following quotations are made in the *Literary Digest*, October 15, 1904 :

“Such a medium” (the minute dust particles of Tyndall's experiment) “may reflect an unusual proportion of waves of short lengths, so that it will appear reddish by transmitted light and bluish by reflected light. Besides this, the plane of polarization in such a medium is situated as Tyndall's experiments indicate. Now, Spring, by absorbing the blue rays of the sky, has demonstrated that the polarization of the sky's light is not a sufficient proof of the optical origin of the blue, since he shows that other rays are also polarized. . . . Lord Rayleigh's theory would rather lead us to

expect a violet color for the sky, which experiments with a long tube confirm. Besides, the dust of all kinds that renders the atmosphere turbid does not rise higher than 1000 to 2000 metres , and the weight and electric state of the air make it impossible for its particles to remain at rest and hasten their combination into flakes.

“M. Spring has made a series of original experiments which prove that a turbid medium will not appear blue to an observer plunged in that medium, unless it has actually a blue color of its own. Finally, in the case of the atmosphere, M. Spring explains, relying on a calculation based on the properties of oxygen in the liquid state, that the amount of this gas contained in the air, without counting the ozone and other bodies, will suffice to give the medium a sufficiently intense blue coloration to explain the appearances that are observed at different heights in the celestial vault. The variations of intensity in the blue and its thinning out in certain directions would be due to the dust which was formerly thought capable of causing its color. The sky is really more blue where there is less dust in the direction of the visual ray.”

Consideration will be given to these conflicting theories of Wallace and Spring in the next chapter. But I wish to remind the reader that, as shown by the quotation just made, Professor Spring lays stress upon the same fact mentioned in my article sent to *Popular Astronomy* and referred to in Chapter I. : "The blue of the sky becomes intensified to the eye when observed from the tops of mountains or in elevated regions, where there is scarcity of vapor and rarity of atmosphere." Professor Spring says, the less dust the deeper the blue color.

CHAPTER III

“Man’s Place in the Universe” ; Wallace’s theory of a dust-sky—The constant sky and the fickle wind—Inconceivable elements in the Wallace theory—Its self-contradictions—A transparent, opaque cloud that you see through and cannot see through as you wish—Density in the line of vision—Possible significance of the fact that oxygen is blue.

I EXPECT to make some further quotations from Wallace’s book, for he is the most modern and thorough exponent of the Herschel and Tyndall theory of the sky, and has added thereto some ideas of his own. But first let me say a word about the book itself. “Man’s Place in the Universe” was written in support of the author’s suggestion that our earth is probably the only world in the sidereal universe which has existed for a sufficient period under the requisite

conditions for the production and evolution of forms of life into anything so high as Man. This suggestion has found very little following in the scientific world, and it seems to me that the book falls short of establishing it. But the book is, nevertheless, a magnificent collection of the latest cosmic news from all fields, and any one having ability to dissociate its information from its author's theory will get much good from it. A theory disagreed with seems to prevent a great many people from getting much out of an otherwise valuable book. For instance, Donnelly's "Atlantis" is a wonderful compilation of valuable and interesting information inaccessible to most people,—obtainable only by industrious research among dusty old manuscripts in out-of-the-way corners of the world; yet, judging from what was said of it, there were many who failed to get much of its great store of good things,

because, forsooth, the author attempted to prove that once upon a time there lived a prosperous, civilized people upon an island or continent now sunk in the waters of the Atlantic. So with this new book of Wallace's. Judging from what I have read about it, that book has had even more than the usual amount of criticism from people who turned over its leaves, but certainly did not *read* it, in any true sense of the word.

It may be that the view which Mr. Wallace thinks "the various results of modern science lend support to,"—namely, "that our earth is the only inhabited planet, not only in the Solar System but in the whole stellar universe," will not seem to others as well supported as it seems to him. But there is no gainsaying the fact that Wallace's book does prove that if there are other inhabited planets in the universe they must be quite few and far be-

tween. He has assuredly taken that question out of the field of fancy and conjecture and placed it firmly within the domain of science.

Wallace's theory is that the blue of the sky is caused by the sun shining upon exceedingly small particles of dust floating in the upper atmosphere. But let Mr. Wallace tell this himself:

“Another phenomenon that indicates the universal presence of dust to enormous heights in the atmosphere is the blue color of the sky. This is caused by the presence of such excessively minute particles of dust through an enormous thickness of the higher atmosphere—probably up to a height of twenty or thirty miles or more—that they reflect only the light of short wave-lengths from the blue end of the spectrum. This also has been proved by experiment.”—“Man's Place in the Universe,” pages 247, 248.

Then follows the description of that experiment fully quoted in the last chapter.

"If there were no dust in the atmosphere, the sky would appear black even at noon."—Page 249.

"As the blue color of the sky is universal, the whole of the higher atmosphere must be pervaded by myriads of ultramicroscopical particles, which by reflecting the blue rays only . . . give us the azure vault of heaven."—Page 252.

"Every dust-particle is of course much heavier than air, and in a comparatively short time, if the atmosphere were still, would fall to the ground. Tyndall found that the air of a cellar under the Royal Institution in Albemarle Street, which had not been opened for several months, was so pure that the path of a beam of electric light sent through it was quite invisible. But careful experiments show that not only is the air in continual motion, but the motion is excessively irregular, being hardly ever quite horizontal, but upward and downward and in every intermediate direction, as well as in countless whirls and eddies; and this complexity of motion must extend to a vast height, probably to fifty miles or more, in order to provide a sufficient thickness of those minutest particles which produce the blue of the sky."—Page 252.

Mr. Wallace argues also that without this dust there could be no rain, so that it is the cause both of rain and of the blue of the sky :

“Over every part of the vast Pacific Ocean, whose islands must produce a minimum of dust, the sky is always blue, and its thousand isles do not suffer for want of rain. Over the great forest plain of the Amazon valley, where the production of dust must be very small, there is yet abundance of rain-clouds and of rain. This is due primarily to the two great natural sources of dust,—the active volcanos, together with the deserts and more arid regions of the world ; and, in the second place, to the density and wonderful mobility of the atmosphere, which not only carries the finest dust-particles to an enormous height, but distributes them through its whole extent with such wonderful uniformity.”—Page 252.

Yes, the uniformity of that distribution of dust must certainly be “wonderful,” for without such uniformity of distribution, and without absolute persistence of

uniformity, there would frequently occur black spots and blotches in the sky, samples of that blackness which Mr. Wallace tells us the whole sky would present were it not for this dust. No such break has ever occurred in the blue of the sky. As Wallace says, "The blue color of the sky is universal." It is not only universal, but it is absolutely permanent, unchanging, constant. In these aspects it surely does not suggest a phenomenon caused by dust transported and held in space by such a fickle carrier as he described the atmosphere to be, "in continual motion ; a motion excessively irregular . . . upward and downward and in every intermediate direction as well as in countless eddies and whirls." Nor does the constancy and universality of this blue color suggest an ingredient such as dust, which is not producible upon that three-fourths of the earth covered by water, and scarcely

producible upon that large area of the remainder covered by forests and eternal snows, while it is wofully plentiful in those regions which nevertheless have no rain during an excessively dusty season lasting six or eight months of the year. It seems to be taxing credulity too much to ask us to believe that this constant, calm, unchangeable, immovable blue is produced by such an unevenly distributed thing as dust carried and held in place by what has been our best natural simile for inconstancy, "the fickle wind." One more quotation from Mr. Wallace's book on this point :

"Since it has been known that liquid oxygen is blue, many people have concluded that this explains the blue color of the sky. But it has really nothing to do with the point at issue. The blue of the liquid oxygen becomes so excessively faint in the gas, further attenuated as it is by the colorless nitrogen, that it would have no perceptible color in the whole thickness of our atmosphere.

Again, if it had a perceptible blue tint we could not see it against the blackness of space behind it ; but white objects seen through it, such as the moon and clouds, should appear blue, which they do not do."

I want to call the reader's particular attention to the last sentence of the foregoing quotation. Am I not warranted in saying that this part of Mr. Wallace's argument, though otherwise intended, lends support to my theory of the sky ? Let us see. In the unpublished portion of my article sent to *Popular Astronomy* in 1894 I said :

" Any substance capable of color and occupying the space between us and the stars, in sufficient quantity to look as blue as the sky, must have such density in the line of vision that it would either shut out the light of the stars altogether as a blue cloud would do, or at least seem to do so by permitting none but the blue rays to come to us."

It will be apparent that this was said to show the utter untenability of Tyndall's

theory which Mr. Wallace adopts. But does not Mr. Wallace admit this very evident inference, when he argues that if the atmosphere were blue, "white objects seen through it, such as the moon and clouds, should all appear blue, which they do not do"?

The term "density in the line of vision" will be readily understood by any one who has seen a fog. We see for a greater or less distance through a fog, but there comes a distance from the eye at last, where the particles constituting the fog and occupying the space between our eyes and an object have finally grown so numerous in the aggregate that we cannot see that object, although we see more or less indistinctly other objects nearer to us. This is what is meant by density in the line of vision. The fog may be no more dense in one place than another, but if we attempt to look *through* it, there is an accumula-

tion of weak densities which in the end make a total density sufficient to hide an object from us. Now, in the proposition controverted by Mr. Wallace in the foregoing quotation, there is the fundamental fact that liquid oxygen is blue. But the air is not *liquid* oxygen ; eighty per cent. of it is colorless nitrogen gas ; the remnant is oxygen gas. True ; but gas and liquid are only different degrees of *density*, and this quality of density may be obtained in the line of vision by piling up a sufficient depth of gas, as well as by changing it into the more condensed form of a liquid. This, of course, Mr. Wallace does not dispute ; he admits it, but says that if oxygen gas were sufficiently deep to have that density in the line of vision, then it would necessarily obstruct our view of the moon, or make it look blue, which would be practically the same thing ; for a blue moon on a blue sky, especially

when both were made blue by the same cause, could not be seen, so as to be discerned, or distinguished from the sky.

I submit that Mr. Wallace's argument is utterly inconsistent. If it be true as he insists, and all must admit, that a depth of oxygen sufficient to look as blue as the sky would shut out the moon from our vision, why would not the same result follow from this blue cloud of dust which he chooses to substitute for the oxygen? His argument is good: it demolishes Professor Spring's theory of the sky as to atmospheric oxygen, but it destroys his own theory equally and similarly.

The color of oxygen may have a good deal to do with the color of the sky, nevertheless. One-half of the total weight of our earth is made up of oxygen. We have every reason to expect that this is just about the proportion of oxygen to other chemicals that

exists throughout space ; and when we get beyond the stars, into that infinite storehouse of raw material, it will not be denied that there is sufficient depth of oxygen there to cause the phenomenon of the blue sky.

CHAPTER IV

The prevailing idea that the universe is finite—

Views of Miss Clerke—Professor Newcomb's mathematical demonstration that an infinite star system would give us a blazing sky—The tentative attitude of those who hesitate to accept this view—Other possible explanations why the whole sky is not as bright as the sun : ether may not be a perfect light carrier ; dark suns and other opaque matter might intercept light—Tyndall's experiments with light, and his theory of its transmission.

IN closing his comments upon my theory of the sky, the editor of *Popular Astronomy* said :

“Again, we cannot certainly affirm that light does not lose something or is not in some way changed in passing through the vast depths of ethereal space. We wish we had definite knowledge concerning the possible-varying conditions of light as it sweeps through space at the awful velocity of 186,000 miles per second.”

That was only ten years ago ; yet every one of those years gave more to science than the twelve centuries between Ptolemy and Copernicus. Since 1895 there has occurred a marked shifting of scientific opinion away from the tentative attitude upon this question as to absorption of light in traversing space, and toward the opposite view, based upon certain facts which are beyond dispute.

Miss A. M. Clerke, the eminent Irish astronomer, in her book, "The System of the Stars," says :

"The sidereal world presents us, to all appearance, with a finite system. . . . The probability amounts almost to certainty that star-strewn space is of measurable dimensions. For from innumerable stars a limitless sum-total of radiations should be derived, by which darkness would be banished from our skies ; and the 'intense inane,' glowing with the mingled beams of suns individually indistinguishable, would bewilder our feeble

senses with its monotonous splendor. . . . Unless, that is to say, light suffers some degree of enfeeblement in space. . . . But there is not a particle of evidence that any such toll is exacted; contrary indications are strong; and the assertion that its payment is inevitable depends upon analogies which may be wholly visionary. We are then for the present entitled to disregard the problematical effect of a more than dubious cause."

Professor Newcomb, an American astronomer of world-wide reputation, says in his book, "The Stars":

"That collection of stars which we call the universe is limited in extent. The smallest stars that we see with the most powerful telescopes are not, for the most part, more distant than those a grade brighter, but are mostly stars of less luminosity situated in the same regions."

At another place in the same book, Mr. Newcomb says:

"There is a law of optics which throws some light on the question. Suppose the stars to be

scattered through infinite space so that every great portion of space is, in the general average, equally rich in stars. Then at some great distance we describe a sphere having its centre in our sun. Outside this sphere describe another one of a greater radius, and beyond this other spheres at equal distances apart indefinitely. Thus we shall have an endless succession of spherical shells, each of the same thickness. The volume of each of these shells will be nearly proportional to the squares of the diameters of the spheres which bound it. Hence, each of the regions will contain a number of stars increasing as the square of the radius of the region. Since the amount of light we receive from each star is as the inverse square of its distance, it follows that the sum-total of the light received from each of these spherical shells will be equal. Thus as we add sphere after sphere we add equal amounts of light without limit. The result would be that if the system of stars extended out indefinitely the whole heavens would be filled with a blaze of light as bright as the sun."

Perhaps Professor Newcomb's estimate that an infinite universe of stars would give us a heavens "as bright as

the sun" was made without taking into consideration the effect of one bright star in eclipsing another. Every bright star must contain opaque as well as brilliant matter, and the effect of opaque matter in stopping light must be the same inside of a body having a luminous surface as it would be anywhere else. The fact is that we do not receive *all* the light radiated from any star. The opaque matter within the star prevents the light upon the opposite side from coming our way. Nevertheless, if there were an infinite number of stars, the heavens would surely be covered with *starlight* and would be brighter than any portion of the Milky Way.

In *Harper's Magazine* for November, 1904, Professor Newcomb sets forth his mathematical demonstration with more detail. Assuming, as a basic unit, a sphere large enough to extend upon all

sides of the sun as far as the nearest star, Alpha Centauri; the next sphere outside with a diameter twice as great is eight times as large and is found to contain eight stars. Imagine a system of spheres extended outward indefinitely, of such dimensions that each contains eight times as much volume as the next one inside of it. Continuing, he says :

“ The general trend of such measures up to the present time is that the number of stars in any of these spheres will be about equal to the units of volume which they comprise when we take for this unit the smallest and innermost of the spheres, having a radius 400,000 times the sun's distance. We are thus enabled to form some general idea of how thickly the stars are sown through space. We cannot claim any numerical exactness for this idea, but in the absence of better methods it does afford us some basis for reasoning. . . . Let us suppose that there are 125,000,000 stars in the heavens. This is an exceedingly rough estimate, but let us make the supposition for the time being. Accepting the view that they are nearly equally

scattered throughout space, it will follow that they must be contained within a volume equal to 125,000,000 times the sphere we have taken as our unit. We find the distance of the surface of this sphere by extracting the cube root of this number, which gives us 500. We may therefore say, as the result of a very rough estimate, that the number of stars we have supposed would be contained within a distance found by multiplying 400,000 times the distance of the sun by 500; that is, that they are contained within a region whose boundary is 200,000,000 times the distance of the sun. This is a distance through which light would travel in about 3300 years.

“It is not impossible that the number of stars is much greater than we have supposed. Let us grant that there are eight times as many, or one thousand millions. Then we should have to extend the boundary of our universe twice as far, carrying it to a distance which light would require 6600 years to travel. . . .

“The inquiring reader may here ask another question. Granting that all the stars we can see are contained within this limit, may there not be any number of stars without the limit which are invisible only because they are too far away to be seen?

“This question may be answered quite definitely if we grant that light from the most distant stars meets with no obstruction in reaching us. The most conclusive answer is afforded by the measure of starlight. If the stars extended out indefinitely, then the number of those of each order of magnitude would be nearly four times that of the magnitude next brighter. For example, we should have nearly four times as many stars of the sixth magnitude as of the fifth; nearly four times as many seventh as of the sixth, and so on indefinitely. Now, it is actually found that while this ratio of increase is true for the brighter stars, it is not so for the fainter ones, and that the increase in the number of the latter rapidly fall off when we make count of the fainter telescopic stars. In fact, it has long been known that, were the universe infinite in extent and the stars equally scattered through all space, the whole heavens would blaze with the light of countless millions of distant stars separately invisible even with the telescope.

“The only way in which this conclusion can be invalidated is by the possibility that the light of the stars is in some way extinguished or obstructed in its passage through space. A theory to

this effect was propounded by Struve nearly a century ago; but it has since been found that the facts as he set them forth do not justify the conclusion, which was, in fact, rather hypothetical. The theories of modern science converge toward the view that, in the pure ether of space, no single ray of light can ever be lost, no matter how far it may travel. But there is another possible cause for the extinction of light. During the last few years discoveries of dark and therefore invisible stars have been made by means of the spectro-scope with a success which would have been incredible a very few years ago, and which even to-day must excite wonder and admiration. The general conclusion is that, besides the shining stars which exist in space, there may be any number of dark ones, forever invisible in our telescopes. May it not be that these bodies are so numerous as to cut off the light which we would otherwise receive from the more distant bodies of the universe? It is of course impossible to answer this question in a positive way, but the probable conclusion is a negative one. We may say with certainty that dark stars are not so numerous as to cut off any important part of the light from the stars of the Milky Way, because if they did, the

latter would not be so clearly seen as it is. Since we have reason to believe that the Milky Way comprises the more distant stars of our system, we may feel fairly confident that not much light can be cut off by dark bodies from the most distant region to which our telescopes can penetrate. Up to this distance we see the stars just as they are. Even within the limit of the universe as we understand it, it is likely that more than one-half the stars which actually exist are too faint to be seen by human vision, even when armed with the most powerful telescopes. But their invisibility is due only to their distance and the faintness of their intrinsic light, and not to any obstructing agency."

It should be said that those who do not accept this view do not reject it. They are merely withholding assent for the present. Scientists, as a rule, are a cautious class. History has taught them that scientific bubbles have sometimes remained intact for centuries. Experience has proved to them that in science it is necessary to think more than the proverbial "twice," a good many times

more, before accepting unconditionally theories so apparently sound that no present argument can be made against them. This is a salutary mental attitude. There will always be with us those who have the "scientific imagination," and without whom the most important revelations would remain hidden ; but imagination may be a false as well as a true guide, and until its pronouncements are subjected to the test of rigid cross-examination and long probation, we wisely withhold our opinion, although we may be strongly inclined to believe them valid. All of us are able to see the real flaws in each other's theories better than those that are in our own, and, whether we submit with good or ill grace, we must submit to the judgment of others in matters of science.

Those who hesitate about accepting the theory that the universe of stars is of finite extent are withheld by the two

considerations mentioned by Professor Newcomb, viz. :

1. Starlight may possibly lose enough in passing through vast spaces, from lack of sufficient carrying power in the assumed medium, ether, to account for the fact that the light of the stars occupies so comparatively small a portion of the sky.

2. There may be, in the intervening spaces between us and an infinite number of bright stars whose light does not reach us, a sufficient quantity of opaque matter, dark suns, and meteoric stones and dust, to totally intercept their light, so that the stars that have been brought to human ken through the eye, the telescope, and the camera, may, after all, constitute only a small fraction of the stars in space.

The first of these suggestions—that light may become wholly lost by mere distance alone—is, of course, beyond the realm of experiment or test. In order

to understand it the reader should first know the theory of light and its transmission, now accepted by physicists as being the most probable. Although Tyndall was not exactly the first pioneer in this field of experimental research, he was among the first, and I do not think any one has improved upon his explanation of it, in "Fragments of Science," pages 170 to 173, which I quote in full, as follows :

"When we see a platinum wire raised gradually to a white heat, and emitting in succession all the colors of the spectrum, we are simply conscious of a series of changes in the condition of our own eyes. We do not see the actions in which these successive colors originate, but the mind irresistibly infers that the appearance of the colors corresponds to certain contemporaneous changes in the wire. What is the nature of these changes? In virtue of what condition does the wire radiate at all? We must now look from the wire as a whole to its constituent atoms. Could we see those atoms, even before the electric current

has begun to act upon them, we should find them in a state of vibration. In this vibration, indeed, consists such warmth as the wire then possesses. Locke enunciated this idea with great precision, and it seems placed beyond the pale of doubt by the excellent quantitative researches of Mr. Joule. 'Heat,' says Locke, 'is a very brisk agitation of the insensible parts of the object, which produce in us that sensation from which we denominate the object hot ; so what in our sensation is *heat* in the object is nothing but *motion*.' When the electric current, still feeble, begins to pass through the wire, its first act is to intensify the vibrations already existing, by causing the atoms to swing through wider ranges. Technically speaking, the *amplitudes* of the oscillations are increased. The current does this, however, without altering the *periods* of the old vibrations, or the times in which they were executed. But besides intensifying the old vibrations the current generates new and more rapid ones, and when a certain definite rapidity has been attained the wire begins to glow. The color first exhibited is red, which corresponds to the lowest rate of vibration of which the eye is able to take cognizance. By augmenting the strength of the electric current more rapid vibra-

tions are introduced, and orange rays appear. A quicker rate of vibration produces yellow, a still quicker, green; and by further augmenting the rapidity, we pass through blue, indigo, and violet, to the extreme ultra-violet rays."

Tyndall has just told us, "the first color exhibited is red, which corresponds to the lowest rate of vibration of which the eye is able to take cognizance." The "ultra-violet rays," which he here mentions, are, upon the other hand, the result of vibrations too rapid to be cognized as colors by the sense of vision. While their existence was known in Tyndall's day, through chemical effects wrought by them, none of them were actually discovered until Roentgen captured those which now bear his name. Others have been found since, and the hunt for them bids fair to continue with success.

"Such are the changes which science recognizes in the wire itself, as concurrent with the

visual changes taking place in the eye. But what connects the wire with this organ? By what means does it send such intelligence of its varying condition to the optic nerve? Heat being, as defined by Locke, 'a very brisk agitation of the insensible parts of an object,' it is readily conceivable that on touching a heated body the agitation may communicate itself to the adjacent nerves, and announce itself to them as light or heat. But the optic nerve does not touch the hot platinum, and hence the pertinence of the question, By what agency are the vibrations of the wire transmitted to the eye?

"The answer to this question involves perhaps the most important physical conception that the mind of man has yet achieved: the conception of a medium filling space and fitted mechanically for the transmission of the vibrations of light and heat, as air is fitted for the transmission of sound. This medium is called the *luminiferous ether*. Every vibration of every atom of our platinum wire raises in this ether a wave, which speeds through it at the rate of 186,000 miles a second. The ether suffers no rupture of continuity at the surface of the eye, the intermolecular spaces of the various humors are filled with it; hence the waves gen-

erated by the glowing platinum can cross these humors and impinge on the optic nerve at the back of the eye. Thus the sensation of light reduces itself to the communication of motion. Up to this point we deal with pure mechanics; but the subsequent translation of the shock of the ethereal waves into consciousness eludes the analysis of science. As an oar dipping into the Cam generates systems of waves, which, speeding from the centre of disturbance, finally stir the sedges on the river's bank, so do the vibrating atoms generate in the surrounding ether undulations, which finally stir the filaments of the retina. The motion thus imparted is transmitted with measurable and not very great velocity to the brain, where, by process which science does not even tend to unravel, the tremor of the nervous matter is converted into the conscious impression of light."

The reader will understand from the foregoing what is implied in the supposition that light may be lost in transmission on account of distance alone. It is conceded on all hands that such loss could not happen if this ether which is supposed to carry the light is absolutely

and equally elastic throughout space. If, however, this quality of elasticity be more or less imperfect throughout ether space, or in parts thereof, then the light of the most distant stars might fail to reach us, not through any defect or want of energy of motion in the source of light-waves, but from inefficiency of the medium to which the vibratory motion is supposed to be imparted, and through which it is assumed the light must come to us, if it come at all.

It may as well be said here that there is no proof whatever, and perhaps never will be, that any such thing as the so-called "ether" exists, and, as the point now under consideration is based upon the assumption that it does actually exist, it will be necessary to inform the reader as to the status of scientific opinion concerning the so-called "luminiferous ether." This will be done in the next chapter.

The reader will readily see that if light does not need any carrier, but can carry itself through space that is absolutely empty, nothing could prevent all the light of all the stars in space from reaching us, except intervening opaque matter. Professor Newcomb's mode of dealing with the latter suggestion seems pretty satisfactory, and the opinions of several other astronomers upon this point will be shown in future chapters.

CHAPTER V

Necessity of examining Science as to its views about the "ether"—Sloane's statement of the ether theory—Professor Comstock's description of wave radiation—Humboldt's history of the ether idea; the *akasa* of the ancient Hindu philosophers transplanted from India to Greece, "precisely similar to the vibrating light-ether of Huygens, Hooke, and modern physicists"—Irving's remarks about the ether—Has the real question been asked?—The worthless half of experimental science.

THE theory that the sky is an envelope of gas or other primary form of matter surrounding the star-system necessarily implies finite dimensions for that system. This idea of a "finite universe" is gaining ground rapidly at the present time, and should it be generally accepted would, as it seems to me, make it necessary to believe that outside of that system there

must exist, in a primary form, material elements similar to those from which that system has been evolved. We thus step quite logically from the finite universe to its envelope of matter in some form, and just as naturally from that to the idea that with the light of countless suns shining upon it, we ought to be able to see it, and hence that we do see it,—that it is the sky.

Those scientists who believe the star system to be finite, advance, as the chief ground of their belief, that were it infinite, the whole heavens would be ablaze with the light of the stars. Against this proposition it is urged by others that perhaps this would not of necessity be the case, inasmuch as it may be possible that light cannot be transmitted indefinitely through space,—that there may be a limit to the conductivity of the “luminiferous ether,” and that the fact of the whole sky not being ablaze with star-

light is consequently just as much proof of such defect in the ether as it is of the finite bounds of the star system, since this absence of light from the sky would follow from one of these causes as easily as from the other. As this objection to the theory of a finite universe is based upon the assumption that *ether is a fact*, let us see what scientists have to say about it.

I will begin by quoting T. O'Connor Sloane, because he gives the best statement I have found as to the supposed qualities of this supposed substance. In Chapter I. of his little book, "Electricity Simplified," he says :

"There are in nature certain mysteries, if such a name does not appear too poetical, which have never been solved and may remain so for all future generations. The conservative scientist is apt to include among such things gravitation, electricity, and perhaps light. To explain the phenomena of

light, an almost inconceivable entity termed the luminiferous ether has had to be invented. By assuming such a thing to exist and to be endowed with almost inconceivable properties, light is explained, and its phenomena are brought into the domain of mathematics. But no direct proof of the existence of the ether has yet been found, and we can hardly venture to hope for one.

“The modern treatment of electricity deals with it as representing and including special phenomena of this ether. Some go so far as provisionally to define it as being the ether itself, and to treat static excitement, magnetism, current electricity, etc., as due entirely to different states of the ether.

“The luminiferous ether is by calculation deduced as being of the following general properties. It is supposed to be a medium most resembling a gas in constitution, yet possessing rigidity like a solid as well as elasticity like that of a gas. Its density is equal to nine hundred and thirty-six one-thousand-million-millionths that of water, or equal to that of air at two hundred and ten miles above the earth. Its rigidity is one one-thousand-millionth that of steel. It is sometimes compared to an all-pervading jelly, through which waves of light and

other radiant energy and of electro-magnetism are constantly throbbing. Particles of ordinary matter move through it without resistance. It interpenetrates the molecules of matter, and hence an air-pump is entirely without effect upon it. There is no such thing as an ether vacuum (Daniel). It cannot be excluded from empty space.

“Such is the hypothetical luminiferous ether, an ultra-gaseous body possessing the properties of both a solid and of a gas. It should be looked upon as an expedient for the present, as something most useful in formulating theories, but unproved. A theory is often little more than a symmetrical skeleton to sustain our laboriously acquired collection of facts. The test of the utility or perfection of a theory is its ability to foretell what will happen under given conditions. It may be able to do this and yet be wholly fictitious.

“Light is radiated from one body to another across enormous intervals of space. The mind cannot conceive of one body acting upon another without some connecting medium. The same applies to gravitation and electricity. The ether originally invented to account for the transmission of light through distances of unknown degrees of immensity in the case of the heavenly bodies, has

been found a useful factor in formulating a theory of electricity.

“If any object is excited electrically, every object within its range of action, that is to say, which is not screened from its effects, is also affected. This involves the same kind of action across a space as obtains in the case of light. It is termed radiant action and is a manifestation of radiant energy. Again, an electric current or the poles of a magnet produce magnetic effects in their vicinity upon objects not in contact with them. This involves action at a distance also.

* * * * *

“Pulses or waves of electric energy are found to act like light, to be capable of transmission through some bodies, of reflection from others, and of refraction and interference. The relations between electrostatic and electromagnetic units indicate a ratio corresponding to the velocity of light. These considerations give direct ground for utilizing the theoretical ether as a medium for the propagation of electrical disturbances.”

Professor George C. Comstock, of the University of Wisconsin, Secretary of

the Astronomical and Astrophysical Society of America, in his "Text-Book of Astronomy," pages 123, 124, gives the following clear description of this ether theory of the propagation of energy by radiation in the form of waves :

"Drop a bullet or other similar object into a bucket of water and observe the circular waves which spread from the place where it enters the water. These waves are a form of radiant energy, but differing from light or heat in that they are visibly confined to a single plane, the surface of the water, instead of filling the entire surrounding space. By varying the size of the bucket, the depth of the water, the weight of the bullet, etc., different kinds of waves, big and little, may be produced ; but every such set of waves may be described and defined in all its principal characteristics by means of three numbers, viz., the vertical height of the waves from hollow to crest ; the distance of one wave from the next ; and the velocity with which the waves travel across the water. The last of these quantities is called the velocity of propagation ; the second is called the wave length ; one-half of the first is called the

amplitude ; and all these terms find important applications in the theory of light and heat.

“The energy of the falling bullet, the disturbance which it produced on entering the water, was carried by the waves from the centre to the edge of the bucket, but not beyond, for the wave can go only so far as the water extends. The transfer of energy in this way requires a perfectly continuous medium through which the waves may travel, and the whole visible universe is supposed to be filled with something called *ether*, which serves everywhere as a medium for the transmission of radiant energy, just as the water in the experiment served as a medium for transmitting in waves the energy furnished to it by the falling bullet. The student may think of this energy as being transmitted in spherical waves through the ether, every glowing body, such as a star, a candle flame, an arc lamp, a hot coal, etc., being the origin and centre of such systems of waves, and determining by its own physical and chemical properties the wave length and amplitude of the wave systems given off.”

I have already spoken of Tyndall as one of the first in the field of experi-

mental research concerning the phenomenon of light. But neither he nor his contemporaries "invented" the ether. It seems rather singular that so many modern scientific writers are in the habit of assuming that the idea of a substance or element pervading all space, and utilized by nature in the transmission of radiant energy, was "invented" by scientists of the nineteenth century, and christened by them with the name of "ether." This, I suspect, is to be accounted for by the fact that scientific research, as well as human effort in other directions, is becoming specialized, so that the personification formerly known as "The man of wide and varied learning" is passing away, and is to be found now only when this widening of mental horizon is a necessary factor in fitting one for his work.

The ether idea is very old indeed, as may be seen by reading from Humboldt's

"Cosmos," volume iii., pages 31-35. I can spare space for only a few quotations, but they will, I hope, suffice for my purpose :

"Although not only the propagation of light, but also a special form of its diminished intensity, the resisting medium acting on the periods of revolution of Encke's comet, and the evaporation of many of the large tails of comets, seem to prove that the regions of space which separate cosmical bodies are not void, but filled with some kind of matter ; we must not omit to draw attention to the fact that, among the now current but indefinite expressions of '*the air of heaven,*' '*cosmical* (non-luminous) *matter,*' and '*ether,*' the latter, which has been transmitted to us from the earliest antiquity of Southern and Western Asia, has not always expressed the same idea. Among the natural philosophers of India, ether (*akasa*) was regarded as belonging to the *pantschata*, or five elements, and was supposed to be a fluid of infinite subtlety, pervading the whole universe, and constituting the medium of exciting life as well as of propagating sound."

After describing the form which the Hindu idea assumed when it reached Greece, Humboldt says :

“ Considered as a medium filling the regions of space, the ether of Empedocles presents no other analogies excepting those of subtlety and tenuity with the ether, by whose transverse vibrations modern physicists have succeeded so happily in explaining, on purely mathematical principles, the propagation of light, with all its properties of double refraction, polarization, and interference. The natural philosophy of Aristotle further teaches that the ethereal substance penetrates all the living organisms of the earth, both plants and animals ; that it becomes in these the principle of vital heat, the very germ of a psychical principle, which, uninfluenced by the body, stimulates men to independent activity. These visionary opinions draw down ether from the higher regions of space to the terrestrial sphere, and represent it as a highly rarefied substance constantly penetrating through the atmosphere and through solid bodies ; precisely similar to the vibrating light-ether of Huygens, Hooke, and modern physicists.

“ The numerous investigations that have been

made in recent times regarding the intimate relation between light, heat, electricity, and magnetism, render it far from improbable that, as the transverse vibrations of the ether which fills the regions of space give rise to the phenomena of light, the thermal and electro-magnetic phenomena may likewise have their origin in analogous kinds of motion (currents). It is reserved for future ages to make great discoveries in reference to these subjects."

As illustrating the attitude of those who combat the idea of "action at a distance," I make the following quotation from Edward Irving's book, "How to Know the Starry Heavens," published in 1904:

"The original idea was that gravitation reaches out from one particle to another, even when they are separated by great distances, with nothing to connect them,—in fact, that there is action at a distance without a medium. This idea has had to be abandoned, for it is evident that a thing cannot act where it is not present. So a connecting *ether* has been 'invented' to carry the energy

of gravitation (and what is known as radiant energy) across from one particle of matter to another. Whether this ether really exists, what it is like, and how it acts, are questions that still keep scientists busy, and will probably not be settled for some time to come." (Pages 171, 172.)

"It is now concluded that all the different forms of energy—gravitation, sound, heat, light, chemical action, electricity, and magnetism—are only different manifestations of one primitive force. This is commonly conceived to be a vibratory motion of the atoms of matter dancing to and fro in empty space, and influencing one another at a distance without any medium.

"When this theory is examined, however, some parts of it prove not only mysterious, but improbable, if not impossible. We can find no satisfactory answer to the question, How can a thing act where it is not present?" (Page 194.)

Perhaps Irving's question is not the real question. Granting, if you please, that a thing cannot act where it is not present, the question does not seem to be that, but whether the thing can make itself present there without a transport-

ing medium. Can it go without assistance, or must it ride on something? The "thing" Irving speaks of, is, of course, some one of the forms of radiant energy,—light, heat, electricity, gravitation. These are never found separated from matter ; therefore it is assumed that, as they travel from place to place, they must have matter or substance of some sort to carry them. But are we warranted in assuming this? We are without means of comparison between an absolutely empty space and space filled with ether. We do not know whether light, heat, electricity and gravitation would move more easily in one than the other. We have no means of reasoning out which condition would be more favorable to the journey. We do not know that light-waves constitute light ; they may be a *symptom* of light,—a species of collateral phenomena, caused by an atmospheric medium which offers some

resistance. So with other waves denoting the existence of radiant energy. How are we to conceive of waves in something that is imponderable,—that offers no resistance to the planets and suns as they fly through it with such marvellous speeds? Is it not wiser to concede a mystery than to make a wild guess?

But it must not be supposed that this ether-theory has been adopted by the physicists with anything like unanimity. There are always, in every department of human life, many who, being busy with their own particular specialties, adopt such theories of other people as they find useful or convenient, caring little and inquiring not at all as to whether the theory itself has a sound basis. These are the people who work their senses too much and their intellects too little, and gather up that one-half of experimental science which Professor

Karl Pearson declares to be worthless. By a different class of men, the thinkers, "ether" is likely to be restored to its place, as a convenient fiction for mathematical purposes. But that is the other side, and deserves a chapter by itself.

CHAPTER VI

The other side of the ether question—Spencer heaves a metaphysical rock—Fiske makes a bull's-eye—The French school of physicists is heard in protest—A metaphysical bogie.

FROM what has been already shown, it will be seen that the ether idea may be adopted for the same purpose that the letter x is used in algebra—to express an unknown quantity. Assuming, as we must, that radiant energy has *some* means of going from place to place, for it certainly does go, and not knowing what that means is, we might as well call it ether as any other name so long as we do not understand it. But we should be more careful, after having given a name to this child of imagination, how far we go in ascribing to it properties and qualities which belong only to *real* things.

No one who candidly and carefully considers the quotations from scientific works set forth in the last chapter can conceive it possible that such a theory, viewed in the light of a reality, and not as a convenient fiction merely, could pass unquestioned the gauntlet of the thinkers. Nor has it. Spencer shied a rock in that direction more than twenty years ago, and Fiske followed with a shot that hit the mark fairly. I quote from "Cosmic Philosophy," volume i., pages 5, 6.

"When we contemplate the mode in which one particle of matter acts upon the adjacent particles by attractive and repulsive forces, we find ourselves equally puzzled. As Mr. Spencer well observes, 'Matter cannot be conceived except as manifesting forces of attraction and repulsion. Body is distinguished in our consciousness from space, by its opposition to our muscular energies; and this opposition we feel under the twofold form of a cohesion that hinders our efforts to rend, and a resistance that hinders our efforts to compress. Without resistance there can be merely empty ex-

tension. Without cohesion there can be no resistance. Thus we are obliged to think of all objects as made up of parts that attract and repel each other, since this is the form of our experiences of all objects. Nevertheless, however verbally intelligible may be the proposition that pressure and tension everywhere co-exist, yet we cannot truly represent to ourselves one ultimate unit of matter as drawing another while resisting it.'

"Nor is this the last of the difficulties which encumber our hypothesis of mutually attracting and repelling particles separated by tracts of unoccupied space. For this hypothesis requires us to conceive one particle acting upon another through a space that is utterly empty; and we can in no wise conceive any such action. How shall we escape this difficulty? Shall we assume that the intervals between the particles are filled by a fluid of excessive tenuity, like the so-called imponderable ether to which physicists are in the habit of appealing? We shall soon find that the problem is only shifted. As soon as we inquire into the constitution of this hypothetical intermolecular fluid, we are no better off than before. For we have no alternative but to regard this fluid as itself an extremely rarefied form of matter:

since it does not perceptibly affect the weights of bodies, we must regard it as possessed of a density that is almost infinitesimal,—that is, its constituent particles must be separated from each other by regions of empty space that are even greater in proportion to the size of the particles than are the spaces that intervene between the molecules of that relatively dense form of matter which we call ponderable. With regard to the ether, as before with regard to the matter, we have to ask, How can its particles act upon each other through space that is utterly empty? How can a thing act where it is not? How can motion be transmitted in the absence of any medium of transmission? And to this question no answer ever has been, or ever can be, devised.

“Thus, whichever horn of the dilemma we take hold of, we are sure to be gored by it. Whether we assume on the one hand that matter is absolutely solid, or on the other hand that it is absolutely porous, we are alike brought face to face with questions which we can neither solve nor elude.”

In the *Literary Digest* of March 4, 1905, in the department of Science and

Invention, there is an editorial article with the title, "Is Action at a Distance Possible?" which is good reading for people who do not take to chimeras. The editor gives an account of the treatment which the ether theory is now receiving at the hands of those physicists who protest against it, especially among French men of science, and I feel that it is so pertinent to our present inquiry that it should be quoted here :

"Is Action at a distance possible ? To the negative answer usually given to this question, and to the consequent attempts to explain apparent cases of action at a distance, we owe some of the greatest advances in modern science. That the distant bell acts on the listening ear only by means of a sound-wave propagated through the intervening air, and that the distant source of light affects the retina by means of a similar wave moving in a suppositious ether, are now familiar results of scientific discovery. Yet a numerous school of physicists has never taken kindly to the absolute denial of action at a distance, and the more so

that one of the fundamental facts of physics, namely, gravitation, has never been satisfactorily explained by the qualities of an intervening medium. This school has been especially strong among French men of science, so we need not be surprised to find its views upheld in a posthumous work of the late M. Charles Renouvier, and mentioned with approval in a review of that work in 'Cosmos,' by M. C. de Kirwan. Says this writer :

“ ‘A thinker to whom some one quoted the philosophical maxim that a body can act only where it is, replied, “But where is it?” And this is not simply a play on words, for it is impossible to designate the place of an action: all we know about is the place of the effect. . . . It had better been said, “a body is where it acts.” And in fact the force and the action are localized only as we consider them scientifically in their effects or in their conditions of existence; in themselves we cannot connect them with place, and we cannot say that they occupy, fill, or bound spaces. . . .

“ ‘Action at a distance remains an ultimate fact, inexplicable by the principles of shock or the pressure of bodies in immediate contact. And this fact (the fact of gravitation) is the foundation

of the most magnificent theoretical structure that science has ever erected.'

"The adversaries of action at a distance rely on the supposed necessity of contact, direct or intermediate, between the acting body and the body acted on. But this contact really has not existence in nature. We must not believe that we see two bodies touch, since between two surfaces in so-called contact there are innumerable molecules whose functions determine, when they touch us, the external relations of our organs and of all our sensations. Doubtless the distances that separate bodies in 'contact' are infinitely small, but they exist, and their extent, no matter how small, does not weaken the principle. Thus argues M. Renouvier, and he goes farther than most of his fellow philosophers, since apparently he denies altogether the necessity of postulating a universal ether, while they content themselves with asserting that the existence of such an ether is no bar to their contention, since it must itself consist of molecules or their analogues, which, though hacked very closely, must act on each other 'at a distance,' however small. Says his commentator :

" 'Whatever we call the principle by virtue of which bodies move in space according to New-

ton's law, we shall not avoid the difficulty. Or rather we shall recognize implicitly—unconsciously, if you will—the reality of action at a distance, while disguising it under different names.

“ ‘ Whether or not we admit the existence of an ethereal medium, the fact of the law formulated by Newton exists none the less. To oppose to this law an *a priori* objection of metaphysical order, is simply to increase the difficulty, without great profit. And to rely on Newton's authority to convict it of absurdity is to forget the circumstances and the difficulties with which the great astronomer had to deal. May not this discourteous objection be turned in another direction and applied to the hypothesis of an ether that is as rigid as the diamond or even more so, and yet impalpable, penetrating, and penetrable, to which we are obliged to resort to avoid the pretended absurdity of action at a distance ?

“ ‘ There are doubtless in the posthumous book of M. Renouvier propositions and theses quite subject to question ; there may be even some that are to be regretted. But we find there also a good number of precious truths, and if the book aids in dissipating the idea that it is impossible for bodies to act and react at a distance, it will have ren-

dered, in our opinion, a great service to science and even to metaphysics.' ''

The trouble with the etherists is that they were not satisfied with a mathematical fiction; they wanted a reality. They first suggested a metaphysical objection, the negation of which is easily conceivable, and, in order to frighten away this metaphysical bogie, they invented another which assuredly is inconceivable. When scientists make a wrong start like this, and then go from bad to worse, as they must, it is a healthful sign to see a halt called, as is now the case in regard to this ether theory.

The reader will not have failed to notice the celerity with which some of the writers quoted in the preceding chapter fall into the use of such expressions as "the mind *cannot conceive* of one body acting upon another without some connecting medium," "It is evident that a

thing cannot act where it is not present." But John Fiske can hardly be suspected of borrowing phrases because they may be found in school-books, or of passing over, without due consideration, any sort of proposition in science or philosophy, and, therefore, I desire to pay some attention to the similar remark made by him in the quotation made at the beginning of this chapter. Fiske did not believe in the actual existence of matter ("Idea of God," page 151). Hence he was ready to admit that "we can in no wise conceive of action at a distance." He was ready to concede that there might be some "external reality" that causes, in consciousness, the effects we call matter, because "things may exist in heaven and on earth which are neither dreamt of in our philosophy nor conceivable by our intelligence." . . . "Thought is not the measure of things," but Fiske held that action of matter upon matter,

of mind upon matter, or matter upon mind, were all equally "unthinkable." ("Cosmic Philosophy," volume i., pages 155, 158 ; volume ii., page 445.)

It is "unthinkable" to me how Fiske, or any one, can believe unthinkable to men that which they actually see and feel. We see the light of the sun, and we feel its heat. Instead of its being impossible for us to think that these phenomena are real and come to us from a real sun, acting upon us from a great distance, the fact is that it is impossible for us to think otherwise, and the best proof of this is that everybody does think it, without any teaching, and without any appreciable effort to reason it out. Everything we see, and everything we think we see, is thinkable. We may be mistaken. Men were mistaken when they thought the sun revolved daily around the earth, but it was not unthinkable. Probably what Fiske really thought was that

the things he spoke of as unthinkable were undemonstrable, metaphysically, and that, to a mind prepared like his own, they were unthinkable. To the common run of people "action at a distance," being something that they see and feel, not only is thinkable, but they are forced to think it. Nor has it been proved that they are mistaken. Nor will any conservative scientist assert positively that they are. But suppose they are mistaken, is it not clear that action at a distance is, nevertheless, thinkable? That mind can act upon matter, Fiske declares unthinkable ; and yet there are plenty of men who think it, because they believe they have seen it,—not ignorant, or thoughtless, or inexperienced men, but men of profound scientific learning, and possessing minds peculiarly fitted, by long training, to judge the scientific value of appearances. From all quarters of the civilized world,—from

the continent of Europe, from England and America, the testimony of such men has come to the Society for Psychical Research, attesting their inability to believe otherwise than that mind can and does act upon matter. Are they mistaken? That is not the question ; the question is whether the suggestion is *thinkable* or not. Things unthinkable, without experience of them, are being constantly forced upon us by enlarged experience.

CHAPTER VII

Is the universe finite?—Inferences from the phenomenon of star “magnitude”—Newcomb’s researches in this field—Young’s statement of the facts—The absolute persistence of light; light from nebulæ and comets’ tails—The discovery of light-pressure—Going into the realm of the inconceivable to find the problematical effect of a dubious cause—Wallace speaks to the point—Carl Snyder adds a new suggestion—Wallace sums up, and, in fancy, paints a blue sky upon a “dark background.”

THE varying light of the stars has been classified under the somewhat misleading term “magnitude,” a legacy from the Alexandrian astronomers, who thought that greater brilliancy meant greater *size*. The classification of stars by the ancients, and until quite modern times, was imperfect, especially as regards the brightest stars,—those so conspicuously bright

that when viewed with the naked eye we at once put them in a class by themselves. There are twenty of these altogether. But when accurate modern methods were applied to the measurement of their light it was found, for instance, that the first magnitude star Sirius gives thirteen times as much light as Regulus, another star of the same class. And between these two there are many and great differences of light magnitude. At the present time this group of twenty stars is divided into three classes,—Sirius, and a star about half as bright, Canopus, in a class by themselves; the seven next most prominent in brightness in another class, and the next eleven less bright in another class, called first magnitude. Besides these three classes of bright stars, all of which are generally treated in text-books and popular expositions of astronomy under the old designation of first mag-

nitude, the stars of fainter brilliancy have been classified, down as far as the twenty-first magnitude. With fairly good eyes, stars as faint as sixth magnitude can be seen upon a clear night with no moon shining. The numbers of these are, according to Flammarion :

First magnitude	20	Fourth magnitude	530
Second “	59	Fifth “	1600
Third “	182	Sixth “	4800

For fainter stars than these, down to the eighteenth magnitude, the telescope is needed. Those still fainter may be photographed, but the telescope does not reveal them,—at least no telescope has yet been made that will do it.

Now, in regard to these different classes of stars, Professor Newcomb has shown that down to the tenth magnitude they exhibit a steady ratio of increasing volume of light, caused, of course, by such a rapid increase in numbers as to over-

come and distance the other factor,—of growing faintness. The total light received from all the first magnitude stars being designated, for convenience, by the numeral 1. The total from those of third magnitude is 2 ; from fifth magnitude stars, 4 ; seventh magnitude, 8 ; and ninth magnitude, 16. So also the total received from the intermediate magnitudes up to tenth would be represented as, second magnitude 1.4 ; fourth, 2.8 ; sixth, 5.7 ; eighth, 11.3 ; tenth, 22.6. From this ratio it is a simple problem in arithmetic to estimate what the total would be if the increase of light continued. The lowest calculation of the total light received from all the stars from magnitude one down to nine and a half is one-eightieth of full moonlight, except the estimate of Professor Newcomb, one-sixtieth of full moonlight for all stars to magnitude eighteen. Some have placed the total starlight as high as one-

thirtieth of full moonlight. In Young's "General Astronomy," page 515, the point is stated as follows :

"How much to add for the still smaller magnitudes is very uncertain. Beyond the tenth magnitude the number of small stars does not increase proportionately fast, so that if we could carry on the account of stars to the twentieth magnitude, it is practically certain that we should not find the total light of the aggregate stars of each succeeding magnitude increasing at any such rate as from the seventh to the tenth. Perhaps it would be a not unreasonable estimate to put the total starlight of the northern hemisphere as equivalent to about fifteen hundred first-magnitude stars, or that of the whole sphere at three thousand. This would make the total starlight on a clear night about one-sixtieth of the light of the full moon, and about one-thirty-seven-millionth that of the sun. The light from the stars which are visible to the naked eye would not be as much as one-twenty-fifth of the whole."

The statement that only one-twenty-fifth of the whole starlight comes from

stars that can be seen with the naked eye is accounted for by the fact that, although stars may be so faint that we cannot see them, their light comes to us. This is demonstrated beyond dispute by the fact that their light does come into the telescope and camera, which it could not do if it did not reach the earth. Any one having good eyes can demonstrate the same thing to himself by seeing stars too faint to be seen by some other person. The starlight reaches both, but only one can see it.

The very rapid increase of starlight coming to us as the stars grow fainter, —twice as much from those of third magnitude as from first ; twice as much from fifth as from third ; twice as much from seventh as from fifth ; twice as much from ninth as from seventh,— would certainly lead us to wonder why the whole sky is not ablaze with light. For although we cannot see a single

star fainter than seventh magnitude, yet where many are grouped in the line of vision, so that they reinforce each other, as in the Milky Way, we can then see their light, although we cannot see them separately. The Milky Way, once thought to be a nebulous mass, is composed almost wholly of stars too faint to be seen separately. Yet, if it were indeed composed of nebulae, the fact of its light coming to us would be much more wonderful ; for the nebulae of the heavens are nothing more than patches of flaming gas or luminous star dust, and they consist of individual forms, of some sort, much smaller than the smallest star. Many nebulous particles whose infinitesimal lights come to earth, and which in the aggregate we are able to see, are doubtless as small as the impalpable dust following a comet, and which causes the phenomenon known as a comet's tail. These are so very small

that, when the comet approaches the sun, the repelling force of the sun's heat overcomes the sun's attraction for them, and they are driven away to that side of the comet farthest from the sun, thus causing the phenomenon that puzzled astronomers until within the last year or two,—the strange fact that a comet's tail is behind the comet when approaching the sun and in front of the comet when going away.

In the Smithsonian Report, for 1903, pages 115-138, also in the *Astrophysical Journal*, volume xvii., No. 5, June, 1903, there is an exceedingly interesting article entitled, "The Pressure due to Radiation," written by E. F. Nichols and G. F. Hull, two American scientists, and containing a history of the progress of investigation of this question from the first half of the eighteenth century to the present time; with full description of a series of experiments conducted by the

writers. The article is illustrated by drawings and diagrams, and its style and language are such as to make it easily comprehensible to ordinary readers. It shows that in this field of investigation there is no longer any doubt that light exerts a pressure upon very fine particles of dust, so as to propel them forward in the direction of propagation of the light rays, and that there is an, as yet, undetermined ratio of gain of this force over the energy of attraction, indicating that if the attraction and light-pressure were radiated from the same body, *e. g.*, the sun, there will be found a certain distance where the light-pressure will overcome the energy of attraction for such dust particles. This comes from the fact that mass is what counts in attraction, while surface is what counts in radiant pressure, and dust may be so extremely fine that the proportion of surface to mass will leave a balance in

favor of the pressure over and above the attraction when the particles approach near the sun. Messrs. Nichols and Hull, as one of their experiments, devised a "laboratory comet's tail," the main factors of which were calcined puff-ball dust mixed with fine sand and placed in the upper half of a glass tube, the tube being reduced to a "neck" at its centre, with an exceedingly small aperture, so that when stood upright, the dust and sand would not fall through into the lower half unless the tube was stroked or tapped lightly. As perfect a vacuum as possible was then made of the tube, leaving in it only the sand and puff-ball dust, and the tube was properly sealed, and stood upright, with the half containing the sand and dust uppermost. A beam of light of "approximately known intensity was then directed horizontally on the lower half of the tube just below the neck. By tapping the tube a fine

stream of sand and puff-ball spores descended. The sand particles fell through the beam, but the spores were driven from the stream sidewise in passing the beam" of light.

The application of this to the point under discussion will be evident. These excessively minute particles composing a comet's tail shine by reflected light,—the sun's light ; it comes to each one of them and is reflected from each one of them, over more than a hundred million miles of space, to our earth. If *one* of them were placed within an inch of our eyes we would fail to see it. Yet the light of the sun shining upon it is reflected over that vast region of space to us, and when millions of billions of these separately invisible lights reinforce each other, as in the comet's tail, we can see the aggregate of them.

Such is the wonderful persistence and indestructibility of light ! Let the reader

get this idea well into his mind, and he will think that Miss Clerke has spoken with moderation when she characterizes the suggestion that starlight may be wholly lost in transmission through space, on account of distance, as "the problematical effect of a more than dubious cause." Think of the microscopic, nebular dust-particles, each sending its infinitesimal ray of light to our earth over spaces as wide as those between us and the most distant stars observable by a four-inch telescope, and then think of a shining sun whose light cannot reach us! Perhaps we would not quite enter the realm of the impossible in such a flight of fancy, but we should most assuredly have penetrated far enough into infinite space to leave abundant room on the hither side for that sky which would be in Newcomb's words "A blaze of light as bright as the sun."

The sky is not ablaze with light. It

is blue. Yet we have seen that down to the tenth magnitude the numbers of the stars increase so rapidly, from magnitude to magnitude, that each successive magnitude sends about fifty per cent. more light to us than its predecessor. Accumulating light thus rapidly, we should certainly expect quite a different looking sky. But the fact is that the light from stars fainter than tenth magnitude does not increase. It begins to fall off, and becomes less and less until we reach stars of the twenty-first magnitude ; and although diminutive nebulous particles, apparently distant as any tenth magnitude star, send their lights to us, we get none from those giant suns which should be around and beyond them, and which should be there in numbers sufficient to make the whole sky brighter than any portion of the Milky Way if the star system were infinite in extent.

The following quotation from " Man's

Place in the Universe," page 152, will be in point here :

"Now it has been calculated as the result of careful observations, that the total light given by stars down to nine and a half magnitude is one-eightieth of full moonlight, though some make it much more. But if we continue the table of light-ratios from this low starting-point down to magnitude seventeen and a half, we shall find, if the numbers of the stars go on increasing at the same rate as before, that the light of all combined should be at least seven times as great as moonlight ; whereas the photometric measurements make it actually about one-twentieth. And as the calculation from light-ratios only includes stars just visible in the largest telescopes, and does not include all those proved to exist by photography, we have in this case a demonstration that the numbers of the stars below the tenth and down to the seventeenth magnitude diminish rapidly."

Carl Snyder, in his book, "New Conceptions in Science," published in 1904, says, page 74 :

"We are aware of the existence of the stars only through their ability to affect the retina or the

photographic plate. The light they send us is mainly white, that is to say, compound. It is a mixture of all the colors of the rainbow, and each of these colors represents a different wave-length. In passing through ordinary substances, like glass or water, the different colors are differently impeded or absorbed. If the light from the pole-star passed through an absorbing medium on its way to the earth, it is likely that the absorption would be, in some degree, selective. One color would be more absorbed than another. The light from the stars would not be white; it would be tinted. There are of course red stars, like Orion, yellow stars, like Arcturus; but there are other stars indefinitely more distant whose light is pure white. The inference, then, is that light is not absorbed or diminished as it traverses space.

“If light is not absorbed, and the number of stars were infinite, then the sky would be ablaze night and day, and we could distinguish the sun only as a rather yellowish disk. The sky is not so lighted; the inference, then, is that the stars are countable.”

Snyder thus emphasizes the fact that all the light of the stars comes to us.

Not one of its component color waves is stopped by intervening causes. This fact was also put forward as proof of my theory in the article sent to *Popular Astronomy* in 1894, where I said :

“The fact that the spectrum of a star’s light discloses *all the rays*, proves that this intensely blue thing that we call sky is beyond the stars.”

The second suggestion,—that there may be a sufficient quantity of opaque matter, dark suns, and meteoric stones and dust, between us and stars of less than tenth magnitude, to shut out the light of the most distant stars,—has at least the merit of being based upon a fact which is known to exist to some extent. Mr. Wallace devotes a chapter of his book to the question, “Are the Stars Infinite in Number?” It appears to be like all the rest of the book, a compilation of all the facts observed, and opinions expressed, up to the date when he

finished writing it, September, 1903, that would throw light upon the subject. I can do no better than to give the reader his summing up of the argument, which is as follows, pages 153 to 155 :

“ We must remember that the minuter telescopic stars preponderate enormously in and near the Milky Way. At a distance from it they diminish rapidly, till near its poles they are almost entirely absent. This is shown by the fact . . . that Professor Celoria, Milan, with a telescope of less than three inches aperture ” (Professor Comstock says four inches aperture) “ counted as many stars in that region as did Herschel with his eighteen-inch reflector. But if the stellar universe extends without limit, we can hardly suppose it to do so in one plane only ; hence the absence of the minuter stars and of diffused milky light over the larger part of the heavens is now held to prove that the myriads of very minute stars in the Milky Way really belong to it, and not to the depths of space far beyond.

“ It seems to me that here we have a fairly direct proof that the stars of our universe are really limited in number.

“ There are thus four distinct lines of argument, all pointing with more or less force to the conclusion that the stellar universe we see around us, so far from being infinite, is strictly limited in extent and of a definite form and constitution. They may be briefly summarized as follows :

“(1) Professor Newcomb shows that, if the stars were infinite in number, and if those we see were approximately a fair sample of the whole, and further, if there were not sufficient dark bodies to shut out almost the whole of their light, then we should receive from them an amount of light theoretically greater than that of sunlight. I have shown at some length that neither of these causes of loss of light will account for the enormous disproportion between the theoretical and the actual light received from the stars ; and therefore Professor Newcomb’s argument must be held to be a valid one against the infinite extent of our universe. Of course, this does not imply that there may not be any number of other universes in space, but as we know absolutely nothing of them—even whether they are material or non-material—all speculation as to their existence is worse than useless.

“(2) The next argument depends on the fact

that all over the heavens, even in the Milky Way itself, there are areas of considerable extent, besides rifts, lanes, and circular patches, where stars are either quite absent or very faint and few in number. In many of these areas the largest telescopes show no more stars than those of moderate size, while the few stars seen are projected on an intensely dark background. Sir William Herschel, Humboldt, Sir John Herschel, R. A. Proctor, and many living astronomers, hold that, in these dark areas, rifts, and patches, we see completely through our stellar universe into the starless depth of space beyond.

“(3) Then we have the remarkable fact that the steady increase in the number of stars down to the ninth or tenth magnitudes following one constant ratio, either gradually or suddenly changes, so that the total number from the tenth down to the seventeenth magnitude is only about one-tenth of what it would have been had the same ratio of increase continued. The conclusion to be drawn from this fact clearly is, that these faint stars are becoming more and more thinly scattered in space, while the dark background on which they are usually seen shows that, except in the region of

the Milky Way, there are *not* multitudes of still smaller invisible stars beyond them.

“(4) The last indication of a limited stellar universe—the estimate of numbers by the light-ratio of each successive magnitude—powerfully supports the three preceding arguments.

“The four distinct classes of evidence now adduced must be held to constitute, as nearly as the circumstances will permit, satisfactory proof that the stellar universe, of which our solar system forms a part, has definite limits; and that a full knowledge of its form, structure, and extent is not beyond the possibility of attainment by the astronomers of the future.”

“A dark background” to the stars is what Mr. Wallace calls the night sky. I have seen the sky look more evenly and deeply blue on a clear night than ever in the daytime. But, whatever its hue, if it be a background to the stars it is beyond them. So far as any one can see, it is the same sky day and night,—the same thing, whatever that thing be; and if it is black or dark at night, I hardly

think Mr. Wallace has given us enough dust to change it to sky-blue in the daytime. Black is not one of the prismatic colors, and so it is not called a color ; but call it what you will, every painter knows that it is the hardest of all things to cover with a color.

CHAPTER VIII

A finite universe and an infinite mass of matter—
Opinions of Newcomb, Irving, and Comstock—
No disagreement as to the infinite spacial extent
of matter—That which is created is necessarily
of finite spacial extent—That which is of in-
finite spacial extent is, of necessity, self-existent.

No more than two possibilities can exist as to the quantity of matter in space. Either it is an infinite or a finite quantity ; that is to say, it either pervades infinite space, or it exists only within some finite area or some number of finite areas therein.

A universe made up of a finite quantity of matter would, of necessity, be finite. But, although scientists have written more or less upon this subject, I have not found any of them expressing an opinion that the *quantity* of matter is finite.

Mr. Young says, "General Astronomy,"
page 563 :

"Nor is there now any reason to suppose that *our own stellar* system is separated from other stellar systems by any vast abyss of practically empty space, relatively proportioned to that which separates our *planetary* system from the possible planetary systems of other suns."

Haeckel says :

"The extent of the universe is infinite and unbounded ; it is empty in no part, but everywhere filled with substance."

Irving says in "How to Know the
Starry Heavens," page 191 :

"We are compelled, by reasoning on observed phenomena, to *believe* that, in one or other of its two forms, this indestructible substance, or matter, fills all the infinity of space, without any void whatsoever."

The "two forms" to which Irving refers are, first, the "ponderable" form,—

the atoms, elements, compounds, gases, liquids, and solids, all of which have the corpuscle as their basis; second, "ethereal." Of the latter Irving says: "It is commonly known as ether. It does not consist of a variety of atoms, like the ponderable matter just mentioned. It is practically imponderable and is absolutely imperceptible to the senses. We have, therefore, only indirect proofs of its existence."

Professor Comstock says, "Text-Book of Astronomy," page 355:

"Each additional step into the depths of space brings us into a region of which less is known, and what lies beyond the Milky Way is largely a matter of conjecture. We shrink from thinking it an infinite void, endless emptiness, and our intellectual sympathies go out to Lambert's speculation of a universe filled with stellar systems, of which ours, bounded by the galaxy, is only one. There is, indeed, little direct evidence that other such systems exist; but the Andromeda nebula is not altogether unlike a galaxy with a central cloud of

stars, and in the southern hemisphere, invisible in our latitudes, are two remarkable stellar bodies like the Milky Way in appearance, but cut off from all apparent connection with it, much as we might expect to find independent stellar systems, if such there be."

So with all whom I have found saying anything upon the subject ; no one conceives of our own stellar system as comprising all matter in existence. The conception that matter fills the infinity of space does not of itself help or hinder the argument that what we see about us is a finite system. It is, however, the only hypothesis that appeals to our understanding, and so it should be accepted as one of the factors with which that argument must reckon. And, moreover, it necessarily leaves an infinite quantity of matter unaccounted for outside of our star system, which *may* be, in whole or in part, a primal form of matter, gas, "star dust," or whatever you choose to

name it, untouched by the hand of Providence, or Nature, or "The Unknowable," or "Evolution," or any force or intelligence of any kind. And this, or some portion of it, may surround us. So that at least we are not without material for our blue sky in that part of space, if matter is not infinitely formed into suns and worlds. In subsequent chapters it will be shown that the law of gravitation operating during an eternal past upon a finite quantity of matter would, if such finite mass of matter were the only matter in all space, inevitably have caused congestion of such finite mass into one solid body, having no stress of attraction from the outside to prevent such concentration.

But the conception of matter as filling infinite space does not bring to my mind any such result as that all this matter must be now condensed into suns and worlds. It suggests the contrary of that.

For, if we concede that matter fills infinite space, we must not conceive the possibility of a beginning to evolution in any part of it, unless we are willing to concede that the results of that beginning must always remain finite in quantity. For it is one of the intuitions of the human mind that any movement beginning in any part of infinite space, and progressing from that beginning in any direction, or in every direction, must of necessity eternally remain a finite quantity, inasmuch as it can never reach the limit of that which has no limit. I say, therefore, without hesitation, and without expecting any one to dissent, that every system of cosmogony thus far imagined, whether it be that of Laplace, or that of Proctor, or anybody else, logically and inevitably leads us to a finite universe for that system. There is no possible escape from this conclusion. Human reason leads to it, and forbids any other.

And so, whatever view we take as to the spacial extent of matter, we are everywhere met with the certainty that in its finite forms it must in the aggregate comprise a measurable quantity.

It may be that there are other universes in other portions of infinite space. It may be that there are millions of them. But it is certain that each one now existing *began* at some time, and so it can never attain infinity in any direction. Infinity may be, as elsewhere stated, an infinite number of finite quantities,—for example, an infinite mass of matter pervading space would be composed of an infinite number of finite corpuscles, or atoms. That is true. But the moment this truth is conceded, we intuitively recognize the further truth that these corpuscles or atoms must have had an eternal existence, for once begin to create them, and the filling of infinite space with them is a task which can only

be done in that "fool's paradise," the realm of the impossible. It cannot be done where such things as truth or reality exist.

The outer boundaries of our stellar system are doubtless quite irregular. They extend much farther into the surrounding envelope of gas, or other primal matter, in the direction of the Milky Way belt, which so completely encircles us, than they do in any other direction. Even the Milky Way seems to extend much farther into space in some places than in others. There may be as many dark suns as bright ones within the bounds of our star system. and there may be as many clouds of meteoric dust there as there are clouds of shining nebulae; but whatever is there, it does not exist in sufficient quantity to obscure from view or visibly affect that all-pervading, constant, persistent, blue color, which comes from something that

must lie still farther beyond, inasmuch as it does not prevent us from seeing sun, moon, planets, comets, stars, and nebulae. The sky is, to all appearance, beyond the stars; and that this appearance seems to be in accord with observed facts, and therefore indicates a reality, has, I trust, been shown in the preceding chapters, as well as anything can be shown, appertaining to that far away region, by any one so meagrely fitted in every way for the task as the writer is. It seems, however, very probable that if the appliances to be found in astronomical observatories, and the investigations of those patient students who labor there, could be turned in this direction, much light could be thrown upon a question which "the scientific imagination" may strongly suggest, and support by "circumstantial evidence," but which requires expert

knowledge and training to handle it in the right way.

Nevertheless, as will be more fully stated in the concluding chapter, the purpose of my argument, in this connection, has not been to prove what the sky is or where it is. The evidences which seem to locate it beyond the stars are merely cumulative to those which show that creation is of finite extent,—that the universe is finite,—and, therefore, that Idealistic Pantheism, resting, as it does, upon the assumption that creation is of infinite extent, and, consequently, that God is of infinite spacial bulk, and so, devoid of personality, is opposed to science, as it was shown in Part I to be opposed to philosophy.

CHAPTER IX

Shape of the star system ; opinions of Wallace, Young, Newcomb, Comstock, and others—The experiment made by Herschel and Celoria—The camera has reached the farthest boundary of the star system—Our sun's central location among the stars, indicating that stellar evolution began in our neighborhood—Gravitation as a factor in the evolution of the star system—History of the idea that bodies of matter attract each other—Newton's predecessors in this field of inquiry ; they *suggested* gravitation ; Newton proved it.

THE star system has an appearance of being shaped, in general outline, something like a round, flat disk, or, perhaps, like a pretty thick double-convex lens, and extends much farther in the direction of the galaxy (Milky Way) than in the two directions at right angles to the plane of the Milky Way. It, of

course, takes in the Milky Way, and the sun is quite close to the centre of the system. Mr. Wallace has collected all the data on this point ("Man's Place in the Universe," chapter viii.), citing many noted astronomers, and setting forth the evidences upon which their opinions are based. Summing up, on page 168, he says :

"It will, I think, now be clear to my readers that four main astronomical propositions have been shown to be supported by so many converging lines of evidence that it is no longer possible to deny that they are, at least provisionally, fairly well established. These facts are, (1) that the stellar universe is not of infinite extent ; (2) that our sun is situated near to the central plane of the Milky Way ; (3) that it is also situated near to the centre of that plane ; (4) that we are surrounded by a group or cluster of stars of unknown extent, which occupy a place not far removed from the centre of the galactic plane, and, therefore, near to the centre of our universe of stars.

“Not only are these four propositions each supported by converging lines of evidence, including some which I believe have not before been adduced in their support, but a number of astronomers, admittedly of the first rank, have arrived at the same conclusions as to the bearing of the evidence, and have expressed their convictions in the clearest manner, as quoted by me. It is *their* conclusions which I appeal to and adopt.”

The opinions of the American astronomers, Young and Newcomb, to the same effect, will be cited hereafter; and the same conclusion seems to be supported by the following statement of Professor Comstock (“Text-Book of Astronomy,” page 354), although Comstock, as elsewhere shown, seems to favor the idea that the stars are infinite in number, and that our own star system is only one of many that fill infinite space:

“The dimensions of this stellar system are wholly unknown, but there can be no doubt that it extends farther in the plane of the Milky Way

than at right angles to that plane, for stars of the fifteenth and sixteenth magnitudes are common in the galaxy, and testify by their feeble light to their great distance from the earth, while near the poles of the Milky Way there seem to be few stars fainter than the twelfth magnitude. Herschel, with his telescope of eighteen inches aperture, could count in the Milky Way more than a dozen times as many stars per square degree as could Celoria with a telescope of four inches aperture; but around the poles of the galaxy the two telescopes showed practically the same number of stars, indicating that here even the smaller telescope reached to the limits of the stellar system. Very recently, indeed, the telescope seems to have reached the farthest limit of the Milky Way, for on a photographic plate of one of its richest regions Roberts finds it completely resolved into stars which stand out upon a black background with no trace of nebulous light between them."

If we are located near the centre of the star system, it seems a reasonable inference that we belong to the *oldest* portion of it. And this is very strongly indicated by the fact that there is a clus-

ter of stars to which our sun belongs, which is roughly spherical in shape and occupies a central position in the plane of the Milky Way. This was proved by both Kapteyn and Newcomb, from observation of the stars near enough to us to show "proper motion." Newcomb says, as the result of his observation, "If we should blot out from the sky all the stars having no proper motion large enough to be detected, we should find remaining stars of all magnitudes; but they would be scattered almost uniformly over the sky."

That these proper-motion stars are "scattered almost uniformly over the sky" indicates clearly that they occupy a region of space almost spherical, whose periphery is almost equi-distant from us in all directions,—in other words, that we are near the centre of this cluster of proper-motion stars. Another significant fact is that among the stars of this

cluster, which Wallace calls "the solar cluster," those having the largest proper motion, indicating greater proximity to us, exhibit similar evidences of old *age* as our sun, as shown by their color and spectra, while those stars whose spectra show them to be *younger* are farther away from us. Commenting on this, Wallace says: "It is a very suggestive fact that most of the stars belonging to this cluster have spectra of the solar type, which indicates that they are of the same general chemical constitution as our sun, and are also at about the same stage of evolution."

If Mr. Wallace had deduced, from these facts, a theory that this region of stars,—the solar cluster, is, in all probability, the only portion of our star system where evolutionary conditions have existed for a sufficient time to produce inhabitants possessing a high order of intellect, probably his brother scientists

would have had little reason to find fault, assuming what is presumably true,—that the conditions of evolution are the same everywhere.

Newcomb says in his book, "The Stars": "So far as we can judge from the enumeration of the stars in all directions, and from the aspect of the Milky Way, our system is near the centre of the stellar universe."

It is not at all likely, nor, so far as I know, has it been suggested by any one, that our stellar universe is the result of a cosmic process beginning upon the outside and progressing inward. Nor is there any belief among astronomers that the entire star system is a unit, such as it would be if all built up as the result of one original impulse pervading the whole of the space it occupies. The motions observed within it are too different and too far from having apparent relation to each other to suggest anything

of that sort. The indications are to the contrary, and that the star system is not the result of a single primal evolutionary effort, but of millions of single births of stars and star systems, succeeding each other. It would be difficult to admit the possibility of a system, like our own for instance, having once obtained a start toward its present condition without giving to the latent energies residing in surrounding matter theretofore dormant, an advantage of position favorable to the conversion of those energies into active forces that would of necessity result in the evolution of other suns and systems. A region of empty space would be cleared between the embryo sun and the surrounding envelope of matter. A region of empty space ! Can empty space be the cause of anything ? Speaking with strict accuracy, No ; yet the existence of that region of empty space means that masses of matter have been so far

removed from each other that the law of gravitation is now at liberty to do things that it has never been able to do before. We have now the Finite in the material kingdom, whereas before we had only the Infinite ; and this void is the boundary between them. To understand the wonderful potentialities of this changed condition, we must inquire concerning the law of gravitation. What can it do now that it could not do before? How can it operate within a finite mass in ways that are closed to it in an infinite mass? We shall, when we understand that law, be convinced that it possesses no *active* power except when operating within finite portions of space and upon finite masses of matter.

What, then, is this energy that has been called gravitation? Answers to this class of questions—referring to such things as life, mind, spirit, and to radiant energy of all sorts—must, at present anyway, and

very likely always in the present state of existence, be limited to describing the phenomena which they cause:—the things themselves—the causes of the phenomena—are mysteries beyond the grasp of science. We can only answer the question, What is gravitation? by telling what it does.

The idea that material bodies have an attraction for each other is very old (Humboldt's "Cosmos," vol. ii., pages 309, 310, and notes). But, like all other truly scientific thoughts which had their birth in early times, it went to sleep when Rome obtained mastery over the Mediterranean world, dethroning art, science, and philosophy, and putting in their places war, plunder, and taxation. From the blows which the Roman power dealt to the old civilizations, the world did not begin to recover for over seventeen centuries, that is to say, from the time of Ptolemy V until the time of Copernicus,

at the beginning of the sixteenth century.

Some of the writings of the early astronomers, preserved in the Alexandrian library in Egypt, were brought to Spain by the Moors. During the thirteenth century portions of these were translated into English and German, and the result was shown by an awakening of interest in England and Germany, and a zeal for astronomical research which soon spread into Italy and France. Civil wars prevented early fruition of this good seed in France and England, and its first results were seen in Germany and Italy. Among those early books there was one, written in the sixth century, by John Philoponus, an Alexandrian astronomer, in which the motions of the heavenly bodies were ascribed to two forces, centripetal and centrifugal,—an impulse to fall upon the earth coupled with a “primitive impulse” to fly away from the earth. It was easy

for Copernicus to transfer this idea to the theory of planets moving around the sun as their centre of attraction ; and this conception of Copernicus was later and more clearly set forth by Keppler in his works "De Stella Martis" and "Harmonices Mundi," A.D. 1618. Galileo was a contemporary of Keppler. Keppler died in 1630, and Newton was born in 1642. Although, as we have seen, the common idea that Newton was the first to ask the question, Why did the apple fall ? is erroneous, and although the conception that gravitation is a factor in producing the motions of heavenly bodies was at least a thousand years old at Newton's birth, yet it is one thing to suggest an idea of that sort, and quite another thing to prove it. Newton proved it, and hence he is credited with having discovered it ; and, after full tribute has been paid to those who preceded him, there remains enough for Newton's

credit to place him far in advance of all others in this particular field of inquiry. He formulated his discoveries and mathematical demonstrations into what has been called "Newton's Law of Gravitation." It is not always stated alike in the text-books ; but there is no material disagreement as to it.

CHAPTER X

The law of gravitation as formulated by Newton :
its three subdivisions—How the energy of
gravitation acts : its mysterious behavior—Why
the law of gravitation is inoperative in an infinite
mass.

THE law of gravitation was stated by
Newton substantially as follows :

“Every particle of matter in the universe
attracts every other particle with a force whose
direction is that of a line joining the two, and
whose magnitude is directly as the product of
their masses, and inversely as the square of their
distance from each other.”

In order that what follows may be the
better understood, I will restate this law
by dividing it into three logical sub-
divisions, without in the least altering its
meaning :

(1) *Direction*.—Every particle or body

of matter in the universe attracts every other particle or body of matter with a force whose direction is that of a line dividing the two.

(2) *Magnitude*.—The magnitude of the force with which particles or bodies of matter attract each other is proportioned to their masses.

(3) *Fluctuation*.—The force of this attraction of particles or bodies of matter for each other fluctuates so as to increase with decreasing distance, and decrease with increasing distance; the ratio of such increase and decrease being such that, if two bodies whose centres are eight thousand miles apart attract each other with a force equal to forty horse-power, then, by decreasing the distance to four thousand miles, their attraction will be increased to one hundred and sixty horse-power, and by increasing their distance to sixteen thousand miles their attraction will be lessened to ten

horse-power ; so that as distance is halved the force of attraction is quadrupled, and as distance is doubled the force of attraction is quartered. As Young says, a mass that will weigh one hundred pounds at the earth's surface, *i.e.*, four thousand miles from the earth's centre, will weigh only twenty-five pounds at an elevation of four thousand miles above the surface,—eight thousand miles from the centre. (Young's "General Astronomy," pages 115, 116.)

In further explanation it may be said that by the "magnitude" of the force of attraction is meant a constant factor, not depending upon anything but the mass. The mass of a body is the quantity of matter it contains ; not its volume, for a body of matter in the form of gas may be large in volume, while the same body condensed to a solid will be comparatively small, but the mass will be the same in

both cases. That mass, whether in the condition of gas or of a solid, possesses a certain amount of attractive energy, and this may be called the "magnitude" of that attractive energy. It takes four times as much of this energy to produce a given amount of attractive force, say forty horse-power, at a distance of sixteen thousand miles as at a distance of eight thousand miles ; but bodies of matter cannot lessen or increase their attractive energy, and therefore a body of matter capable of producing a certain quantity of attractive force, *i.e.*, doing a certain amount of work, at eight thousand miles' distance, will do only one-quarter as much work at sixteen thousand miles' distance, because the increased distance has quadrupled the difficulty of doing the work. This is analogous to what happens if a man takes one end of a pole in his hands and tries to lift the other end,—the longer the pole the harder

becomes the task. His full strength may be sufficient to move the farther end of a pole ten feet long quite rapidly upward. But increase its length to twenty feet ; now let him again put forth all his strength, and the farther end of the pole is raised quite slowly. In both cases he has exerted all his strength ; let us say the "magnitude" of that strength has been the same in both cases, but its effect has been much less on the long pole than upon the short one.

While attractive energy appears to radiate in all directions from a body of matter, this radiation certainly does not lose strength through increasing distance in the same way as light does, —*i.e.*, by diffusion of a unit of radiant energy throughout a constantly broadening area of space. For instance, a certain amount of light will send more rays to a gaseous body than to the same body condensed into a solid ; not so with

gravity ; it pulls the one as much as the other. The direction of the force of attraction is a line joining the centres of the two attracting bodies, and all the attractive energy is expended upon that line when they are spheres, as in the case of the stars and planets. There is another very singular thing about this energy of gravitation : take the case of the Sun attracting Mercury, for example. It is not supposable that the Sun exerts any less than his entire power of attraction upon Mercury. Now give him another planet, Venus ; he continues to exert his full power upon Mercury, and he also exerts his full power upon Venus. Add the Earth ; his full power of attraction is now exerted upon each of the three. Add the outer planets, Mars, Jupiter, Saturn, Uranus, Neptune ; go on and surround him completely with an envelope of planets, so that there shall be trillions of them. He exerts his full

power of attraction upon each and all of them. Here is something that eludes mathematics,—a veritable mystery. We need not forget that two bodies of large mass will be drawn together more forcibly and rapidly by attraction than would be the case if the mass of one of them were reduced, but that is because they attract *each other*. What I am calling attention to is the attractive energy latent in a body,—energy lying there ready for use if occasion comes. Suppose a material sphere of a given size, and another one-tenth as large. There would be a certain distance at which the larger sphere can pull the smaller one with a force equal to one hundred horse-power. Now, we cannot suppose that the larger body has really the power to do more than this,—that the expenditure of this energy, which at that distance has been converted into one hundred horse-power, is less than the entire attractive energy

possessed by the larger of the two bodies. Yet place another similar mass of matter in another direction from it and it will put forth another one hundred horse-power in pulling that; place a thousand such bodies at the same distance and we have one hundred thousand horse-power; place a million and we have one hundred million horse-power; surround it with them so that there shall be a complete shell of these globes, say a trillion of them, and this one central globe exerts attractive force equal to one hundred trillions of horse-power. Each new demand seems to add to the supply of energy; and so, gravity is the mystery of mysteries of the material universe, refusing to be explained by the ether theory, or any other.

As these comments upon the law of gravitation may have diverted the reader's attention from the question, What is gravity able to do in a finite universe

that it cannot do in an infinite mass? I wish to now recall the foregoing statement of Newton's law of gravitation, and its three logical sections or subdivisions. It is quite plain that in an infinite space filled with matter, the first and second sections of this law would be the only parts of it in effect, and would keep everything *at a stand-still*. An infinite mass of particles and bodies of matter surrounding each and every individual body and particle would exert an equal pull in all possible directions. These pulls would exactly neutralize each other, and the condition would be precisely as if no such thing as gravity existed. Start any one of these bodies, or particles, in motion, and it would continue moving in a straight line in the direction of the force imparted to it, just as if neither it nor any other matter in infinite space had any such property as attraction, because any pull against such imparted

motion by the infinite mass of matter behind would be neutralized by an exactly equal pull from the matter lying ahead.

It follows, necessarily, that there is only one condition under which the property of attraction can exhibit itself, and that is, greater proximity of two or more particles or bodies of matter to each other than to any others. This suffices to put into effect the third section of the law. The infinite mass of matter in space is a unity, a single thing when considered as a whole. Therefore it cannot be reached by the third section of the law, which does not apply to unity, but to divisions, or parts of the whole. The *one* infinite mass can therefore be affected only by the first and second sections, whose effect, unaided by the third, is nothing, as we have seen, on account of neutralization. But when a body or particle becomes segregated from the surrounding infinite mass in such way, or to such an

extent, that any other particle or body can come nearer to it than to any other, then, when that condition of greater proximity takes place, the third section of the law applies, and those particles or bodies set up an independent attracting business of their own, governed by all three of the laws of attraction, but totally unaffected by the sum-total of attractive energies expended in infinite space.

Thus we see that it is only in finite space, and as to finite masses of matter, that gravitation produces results of any sort.

CHAPTER XI

Gravitation and the Finite—The potentiality of a zone of empty space—The beginning of evolution,—a boundary between the Finite and the Infinite—Birth of the first sun—Probability that star-evolution progresses from within outward—More evidence that the universe is finite—What lies beyond the star system.

AND now let us return to that most wonderful of all epochs in evolution, when a boundary of void space was first placed between the Finite and the Infinite. We do not know, nor can we ever know, what the preliminaries were,—how it was done. We know that it was done because an instance of it exists before our eyes,—in the case of our own solar system, which is separated from the nearest stars by empty space for a distance of twenty-five millions of millions of miles. Ample room this for the third

section of the law of gravitation to be in effect, unhampered by the attraction of those far-away suns ; their pulls upon us can only be counted as part of the infinite number of pulls coming to us in all directions from all the bodies and particles of matter in infinite space, and which, as before stated, balance and neutralize each other. It is not to be supposed that any such enormous depth of void space marked the first separation of the Finite from the Infinite. But some zone of space was cleared between them, else the present condition could never have come to pass. Whatever the extent of that zone of separation—greater or less—it was enough to release the law of gravitation from its prison of Infinity, for the law that the power of attraction is lessened by increasing distance applies to all distances. That law, thus in force, would gradually broaden the distance between the first embryo sun and the in-

finite mass surrounding it. Finite qualities would be imparted to the matter composing this new sun and also to the inner crust of that infinite mass. What I mean by this is, that the third section of the law—that portion of it which operates only under finite conditions, separation, isolation, distance—would now be in effect. This void zone of separation would remove the particles of matter of our embryo sun so far from those composing the inner crust of the surrounding mass that the pull of gravity instead of being equal in all directions, as it was before, would be weakened upon the side adjoining this empty space, so that the pulls would now be strongest in all directions *away from* this empty space, —*inward* as to the particles of the new sun, and *outward* as to the particles at the edges of the surrounding mass beyond this empty space. The latter particles, being now appreciably relieved

from the stress of gravity upon the inner side, would be pulled more forcibly outward, while the particles of this new sun, being released perceptibly from the stress of gravity on the outside, would begin to attract each other more forcibly, tending, of course, toward the centre of gravity within their mass. The surrounding void would be, as it is, intensely cold. The condensation taking place in the new sun, and in the inner crust of the mass beyond this region of cold, would produce heat; as the condensation became greater the heat would become more intense. This condensation and consequent production of heat would go on with far greater rapidity in the new sun, because there everything would converge toward the centre. Vast eruptions, caused by explosions in the more condensed matter from which the new sun was forming, would shoot across this empty space and enter the infinite mass, caus-

ing storms, explosions, and convulsions in it. These explosions, following the line of least resistance, would shoot inward, populating this empty zone with other bodies of matter which, governed by the third section of the law, would condense. They might fall into the new sun if propelled in one direction; propelled in another direction, they would re-enter the infinite mass at some other point again by friction, igniting it, causing new explosions with similar effects. This process once begun must go on forever. Any cessation of it is inconceivable, because any cessation of its cause is impossible. The Finite has obtained a foothold in space; evolution has begun. The gradual enlargement of that finite universe is now inevitable; it constantly bombards the Infinite, sending its conquering invasions across the abyss of separation, bringing back the spoil of war. It will never stop for lack of other

worlds to conquer, for all about it lies the impotent mass of the Infinite, powerless to move, and strong only in its exhaustless supply, which suffers nothing by depletion, remaining, after each new raid from the Finite, as plethoric as before, for it has no bounds.

Explosions like those I have suggested as taking place in the first embryo sun are witnessed to-day in miniature upon the surface of our sun, where streams of burning matter are thrown up to heights of more than one hundred thousand miles,—sometimes over two hundred thousand miles. All this would be inevitable when the process once began anywhere. This is all easily imagined. But a process beginning upon all sides from without and progressing inward is exceedingly improbable, to say the least.

If, then, we are located near the centre of the star system, the observed fact of decreasing numbers of stars in regions

of space far removed from us is just what we should expect. In other words, we should certainly know that at some boundary outside of us, in all directions, we must come to the *present* limit of that particular finite effort of creation to which we belong, which began here, or near us, and is progressing outward. And there we should expect to find, not ready-made suns, but the raw material from which suns have been formed, and from which other suns are *to be* formed. I have already quoted from Comstock on this point,—the position occupied by our solar system among the stars. As to Wallace, I need only say that his book is largely devoted to a collection of facts all tending to show the same thing. In the following quotation from Young's "General Astronomy," we have the opinions of both himself and Newcomb, pages 562, 563 :

"It is certain, however, that the faint stars *as a class* are smaller and darker and more remote

than are the bright ones *as a class*; and accepting this, we can safely draw from the star-gauges a few general conclusions, as follows :

“We present them substantially as given by Newcomb in his ‘Popular Astronomy,’ page 491.

“1. ‘The great mass of the stars which compose this (stellar) system are spread out on all sides in or near a widely extended plane, passing through the Milky Way. In other words, the large majority of the stars which we can see with the telescope are contained in a space having the form of a round, flat disk, the diameter of which is eight or ten times its thickness.

“2. ‘Within this space the stars are not scattered uniformly, but are for the most part collected into irregular clusters or masses, with comparatively vacant spaces between them.’ They are ‘gregarious,’ to use Miss Clerke’s expression.

“3. Our sun is near the centre of this disk-like space.

“4. *The naked-eye stars* ‘are scattered in this space with a near approach to uniformity,’ the exceptions being a few star-clusters and star-groups like the Pleiades and Coma Berenices.

“5. ‘The disk described above does not represent the form of the stellar system, but only the

limits within which it is mostly contained.' The circumstances are such as to 'prevent our assigning any more definite form to the system than we could assign to a cloud of dust.'

"6. 'On each side of the galactic region the stars are more evenly and thinly scattered, but probably do not extend out to a distance at all approaching the extent of the galactic region,' or if they do they are very few in number; but it is impossible to set any definite boundaries.

"7. On each side of the galactic and stellar region we have a nebular region comparatively starless, but occupied by great numbers of nebulae."

Very significant facts, these. Assuredly they indicate a much lesser progress in the evolution of star systems in a direction at right angles to the plane of the Milky Way than toward that vast belt of stars. If any reader will look at the sky when the Milky Way is well risen toward meridian, he can easily observe this fact with the naked eye. But, as shown in the passage quoted from Professor Comstock's book, the evidence

of the telescope is still more convincing on this point, a small telescope disclosing as many stars as a large one in those regions of the sky at right angles to the galaxy, while in the galaxy and its neighborhood the larger the telescope the greater will be the number of stars found. And the largest telescopes do not find stars in these seemingly barren regions fainter than magnitude twelve. This is very significant, for it is the general belief of astronomers that, as a rule, faintness means greater distance, and the absence of faint stars in any region of the sky indicates that the most distant stars there are nearer to us than the most distant ones in places where there are great numbers of faint stars. If we apply our reason to this fact we shall be inevitably led to the conclusion that the sidereal system is finite in extent. No other condition will satisfactorily account for this phenomenon.

What lies beyond this system of stars? Is it empty space? No one believes that. As Comstock says, "We shrink from thinking it an infinite void." If, then, we cannot accept the belief that it is empty, and the telescope proves that there are no stars there save those it discloses, what is it that keeps it from being a void,—what fills it in the absence of suns? And here we are met with another fact of great significance: those regions where there are few stars are rich in nebulæ, rich beyond comparison with those regions where stars abound. If we apply our reason again to this fact, we conclude that the regions where there are few nebulæ were once rich in nebulæ which have condensed into suns, so that evolution has progressed far in those directions, while in regions of the sky where stars are few and nebulæ abundant, the process of this evolution is going on much

nearer to us. What is beyond? That it is not void seems to be conceded by all; that it is not filled with stars is proved; that it is filled with primary forms of matter, such as the stars have been evolved from, is a necessary conclusion. Can we see this substance? Why not? There seems to be an abundance of light in its neighborhood to reveal it to us. Do we see it? We see something that certainly looks as if it were there. We see something so deeply colored that if it were in our atmosphere it would surely prevent us from seeing a single star. It seems as if there is no escape from the conclusion that it is the sky.

CHAPTER XII

The lesson to be learned from a finite universe ;
its refutation of the fundamental tenet of Ideal-
ism—The fallacies of Idealism ; the danger to
Christianity.

IN conclusion, let me again warn the reader against misinterpreting the purpose of the argument contained in the second part of this book. My effort has been to show that the universe is finite. Incidentally, the same facts and arguments which prove the finite extent of the universe seem also to prove that the sky is beyond the stars. But if I am mistaken in this inference, that mistake does not in the least affect the validity of the argument that the universe is finite in extent ; and this is the point under consideration. The first part of

this book was devoted to a discussion, from the stand-point of philosophy, of the idea of that system of theology known as Idealistic Pantheism,—the idea of a God of infinite bulk. As God must be known by His works, and as Idealism denies that He can in this life be known otherwise than through nature ; and as it asserts that He is in, through, and of, *all* nature,—the creator of both evil and good, of both pain and pleasure,—it became necessary to inquire into the spacial extent of this “nature” which is claimed to reveal Him. If this nature is finite in extent, then we find that Idealism has failed to explain how a God of infinite spacial extent can be revealed by a nature which is of finite extent ; or why, if God is of infinite spacial size, nature is not also spacially infinite ; or how He can be conceived of as busy in that finite portion of space where evolution is found, and yet infinitely idle

throughout that infinite space which finite nature can never reach.

An idea of God is absolutely essential to religion. The Idealists will not deny this. Fiske, to whom Darwin paid the compliment of saying that he was the clearest of all writers and thinkers, says that religion's three postulates are : first, a quasi-human God ; second, the undying human soul ; third, the ethical significance of the unseen world ("Through Nature to God," pages 162, 168, 171). And Fiske was an Idealist after a type of his own. I do not quote Fiske's admission, that religion's first postulate is a quasi-human God, as a tenet of Idealism. Probably there are not many Idealists who have been able to think clearly enough to be forced to that conclusion. Fiske, though forced to it, was unable to explain it consistently with the tenets of Idealism. But when his reason could not be convinced his faith sustained him.

And so he held that in some inexplicable way the two ideas—the idea of an infinitely spacial God, the postulate of Idealism, and the idea of a quasi-human God, the first postulate of all religious belief—could be blended together, not in human or finite conception, but in the conception of God.

It may be asked, why do I call Fiske a teacher of Idealism? He professed to differ from the chief exponents of Idealism in many important respects. When I speak of Fiske, or any other philosopher, as an idealist, I have reference to the conception of God to which their philosophies have brought them. Philosophers have adopted different names for their philosophies because their methods of philosophizing have differed, but I am dealing more with results than methods. Fiske was a disciple of Spencer, but he went farther than Spencer in elaborating a concep-

tion of God, as being "in all, of all, and through all." If this be not Idealism, what is it?

This is a mental attitude fraught with danger to religion. It is not possible for religion to have more than spasmodic and phantasmic existence in such an atmosphere. When we are asked to change our idea of God from a simple belief in a Being who has personality, and are urged to adopt views, the logical results of which are that He has not personality, and is unthinkable and unknowable, so that if we still continue to believe in His personality we must do so in opposition to our reason, and in opposition to the ideas of order, law, and truth which His works reveal to us, we have a right to demand the very best of reasons for the proposed change of belief. And when, upon inquiry, we find that Idealism asks us to believe in a God who existed during an eternity before the

existence of either good or evil, and consequently without knowledge of either, as they cannot exist outside of consciousness, we must inquire further as to what moral ideas existed in the consciousness of the God of Idealism during this eternity. Finding that good and evil comprise the sum-total of all ideas, we are led to inquire what sort of being could exist without possessing ideas of any sort? How could he have made plans without ideas? For if God *created* good and evil, He did it "once upon a time." That goes without saying. What about the time that passed before that moment when good and evil were created? It was an eternity, of course. God, the Idealist tells us, is in His nature purely psychical, spiritual. So say we. But what sort of psychical being could exist before ideas of any sort came into existence? How are we to dissociate ideas from God? How are we to con-

ceive of one existing without the other? Will Idealism tell us? On the contrary, it purports to be an idea doctrine. It took its name from the word. Thus Idealism destroys itself when it asks us to believe that good and evil, the sum-total of all ideas, were created. Has not Idealism, in order to force upon us a God of infinite bulk, been obliged to abandon another element of infinity,—His eternal existence? For, surely, it is inconceivable that there could have been any God before the existence of ideas of any sort. But here, again, Idealism destroys itself, since anything which has had a beginning cannot be or become spacially infinite.

To that constantly increasing number of people who are in the habit of using their reason and common-sense in matters pertaining to theology and religion, as well as in other matters, the logic of Idealism, if followed out completely, leads irresistibly to Materialism.

The Materialist is the only consistent Monist. Those whose faith in God is, like Fiske's, too strong to be disturbed by Idealism, or anything else, are safe. But there are not so many such. A more numerous class is made up of those who have obtained a smattering of the Idealistic philosophy, and, thinking they understand it, sow its tenets broadcast among people whose minds may be so constituted that they are compelled to trace ideas to their logical conclusions. Such a mind must eventually abandon Idealism, or adopt Materialism, unless he belongs to that select few who, like Fiske, have a faith too strong to be shaken. Neither Berkeley, nor Spinoza, nor Fichte, nor any of the teachers of Idealism, except Fiske, ever traced ~~that~~ philosophy to its complete logical conclusions. Fiske, indeed, is the only one of them all who made a philosophy of it, —taking in its relations to *all things*, its

significance from all points of view. With the others it was not a philosophy, but a theology.

The number of Christian believers who stand in danger of being led astray by Idealistic teachings is not numerically large, compared with the whole body of Christians. But, nevertheless, as before stated, they comprise a very important class ; they are usually educated ; they teach ; they preach ; they write books ; they write for the magazines ; they are heard by very large numbers of their class ; they have wide influence. They control the Christian churches of every denomination. Now what I mean by this is, that Idealistic teaching is much more likely to be *met with* by the educated class, and that this class is constantly on the increase, and, therefore, destined to be in the majority. I do not mean that Idealism is more likely to be accepted

by this class of people than by others. There is always a large class who can accept religious belief of almost any sort, because, with them, the more mysterious and inconceivable it is the more it commends itself. If their priest, or minister, or prophet preaches it, that is enough to fully satisfy them.

I see distinctly, to-day, and have been seeing more and more distinctly for many years past, the great danger with which Idealism threatens Christianity. I have waited for some recognized Christian teacher to sound the note of alarm, and expose the utter fallacy of this system of theology, which, while pretending to lead us to God, leads us to nothing,—giving us stones when we have asked for bread. I have not heard the voice of any Christian teacher raised in an effective way to warn against this danger; on the contrary, I have watched many of them falling into the ditch,—blind Christians led by

blind Idealism. While I have, during practically my whole life, been a reader and student in many and divers fields of inquiry, my active life has been devoted to the legal profession. It would certainly seem more appropriate for some clergyman to have written this book or some book having the same purpose. But it is possible that legal training may fit one to a certain extent for such a task, and, at all events, a voice from "the bar" will, with God's help, have force, and perhaps more force, in a way, than one coming from the pulpit. For, surely, when the occasion is such as to cause an humble attorney to sound the alarm, those who ought to cry out—whose duty it is to do so, should be awakened from their lethargy.

The world needs Christianity,—the Christianity of Christ. There are many things, as there have always been in civilized lands, as well as in other places,

that are evil, that constantly threaten to overturn civilization, or change it to a civilization worse than barbarism,—as history teaches us such evils, uncontrolled, have done before in not a few cases. Religion is the only force that can preserve civilization from these dangers. And, in Christian countries at least, the only religion that can do it is Christianity, and the only organized force that can save us is the Christian Church ; and I use that term in the customary broad sense as 'including all Christian denominations. I do not mean to assert that the Christian Church has done all that was possible for the betterment of government or society ; it has too seldom comprehended, more than vaguely, its duties. But this I know, that it can save civilization and make it worth while, and that there exists no other organized human activity which has the power to do this ; therefore I believe that to de-

defend the Christian religion is to defend civilization, for a civilization without religion has no adequate means of preserving itself.

APPENDIX

APPENDIX



AKASA—Ah-kah'sah (the a in first and last syllables is pronounced like a in sofa; the a in middle syllable is pronounced like a in arm). The ancient Hindu philosophers taught that there were five elements, fire, water, earth, air, and akasa, the province of the last being to conduct sound.

ANTHROPOMORPHISM—An''thro-po-mor'fizm; ascribing human attributes to spiritual beings, especially to God.

ARISTOTELES—Ar-is-tot'e-leez.

HAECKEL—Hek'el.

HEGEL—Hay'gel.

HERSCHEL—Her'shel.

LEIBNITZ—Libe'nitz.

MARTINEAU—Mar'tin-o.

NOUMENA—Noo'men-ah, plural of Noumenon. The noumenon is defined as the thing itself, its phenomena as those qualities of the thing, cog-

nized by the mind through the senses of sight, hearing, touch, etc. The Idealistic theory is that since phenomena are cognized by the senses and cannot reach the mind otherwise, they arise wholly from the mind which is in us, and therefore the noumenon being external must, if it exists at all, be unknown to us. The view opposed to this has been stated in different ways (see Fiske's "Cosmic Philosophy," volume i., chapter iv.). I prefer the following statement, which is original: Idealists have *assumed* as a premise of their argument that all the factors which combine to make up what is called a phenomenon are derived from the consciousness of persons. The truth, however, is that in this idealistic sense there is no such thing as phenomenon, because what has been called by that name is made up of two factors. Take, for illustration, a star. It is made up of the sense of sight and the thing seen. Without sight, the thing (the star) could not be cognized, as no other sense can bring it to the mind; without the star the sense of sight alone would be powerless to cause the phenomenon. The word phenomenon is therefore the larger term, embracing within its meaning both factors, while the term noumenon embraces only one.

PARMENIDES—Par-men'i-deez.

Parmenides was a celebrated Greek philosopher who lived in Southern Italy in the fifth century B.C. He is represented as a master of the art of logic. At the request of a company of learned men he consented to exhibit his dexterity in this respect, and selecting as his respondent the youngest member of the company, Aristoteles, the conversation proceeds as follows :

PAR. If one is, the one cannot be many?

ARIS. Impossible.

PAR. Then the one cannot have parts, and cannot be a whole?

ARIS. How is that?

PAR. Why, the part would surely be the part of a whole?

ARIS. Yes.

PAR. And that of which no part is wanting, would be a whole?

ARIS. Certainly.

PAR. Then, in either case, one would be made up of parts, both as being a whole, and also as having parts?

ARIS. Certainly.

PAR. And, in either case, the one would be many and not one?

ARIS. True.

PAR. But surely one ought to be not many, but one?

ARIS. Surely.

PAR. Then, if one is to remain one, it will not be a whole, and will not have parts?

ARIS. No.

PAR. And if one has no parts, it will have neither beginning, middle, nor end; for these would be parts of one?

ARIS. Right.

PAR. But then, again, a beginning and an end are the limits of everything.

ARIS. Certainly.

PAR. Then the one, neither having beginning nor end, is unlimited?

ARIS. Yes, unlimited.

PAR. And therefore formless, as not being able to partake either of round or straight.

ARIS. How is that?

PAR. Why, the round is that of which all the extreme points are equidistant from the centre?

ARIS. Yes.

PAR. And the straight is that of which the middle intercepts the extremes?

ARIS. True.

PAR. Then the one would have parts and would be many, whether it partook of a straight or of a round form?

ARIS. Assuredly.

PAR. But having no parts, one will be neither straight nor round?

ARIS. Right.

PAR. Then, being of such a nature, one cannot be in any place, for it cannot be either in another or in itself.

ARIS. How is that?

PAR. Because, if one be in another, it will be encircled in that other in which it is contained, and will touch it in many places, but that which is one and indivisible, and does not partake of a circular nature, cannot be touched by a circle in many places.

ARIS. Certainly not.

PAR. And one being in itself will also contain itself, and cannot be other than one if in itself; for nothing can be in any thing which does not contain it.

ARIS. Impossible.

PAR. But then, is not that which contains other than that which is contained? For the same whole cannot at once be affected actively

and passively, and one will thus be no longer one, but two?

ARIS. True.

PAR. Then one cannot be anywhere, either in itself or in another?

ARIS. No.

PHILOPONUS—Phil-op'o-nus.

PLATO—Play'to.

RENOUVIER—Ren-oo'vee-ay.

SCHELLING—Shel'ling.

SPINOZA—Spee-no'zah.

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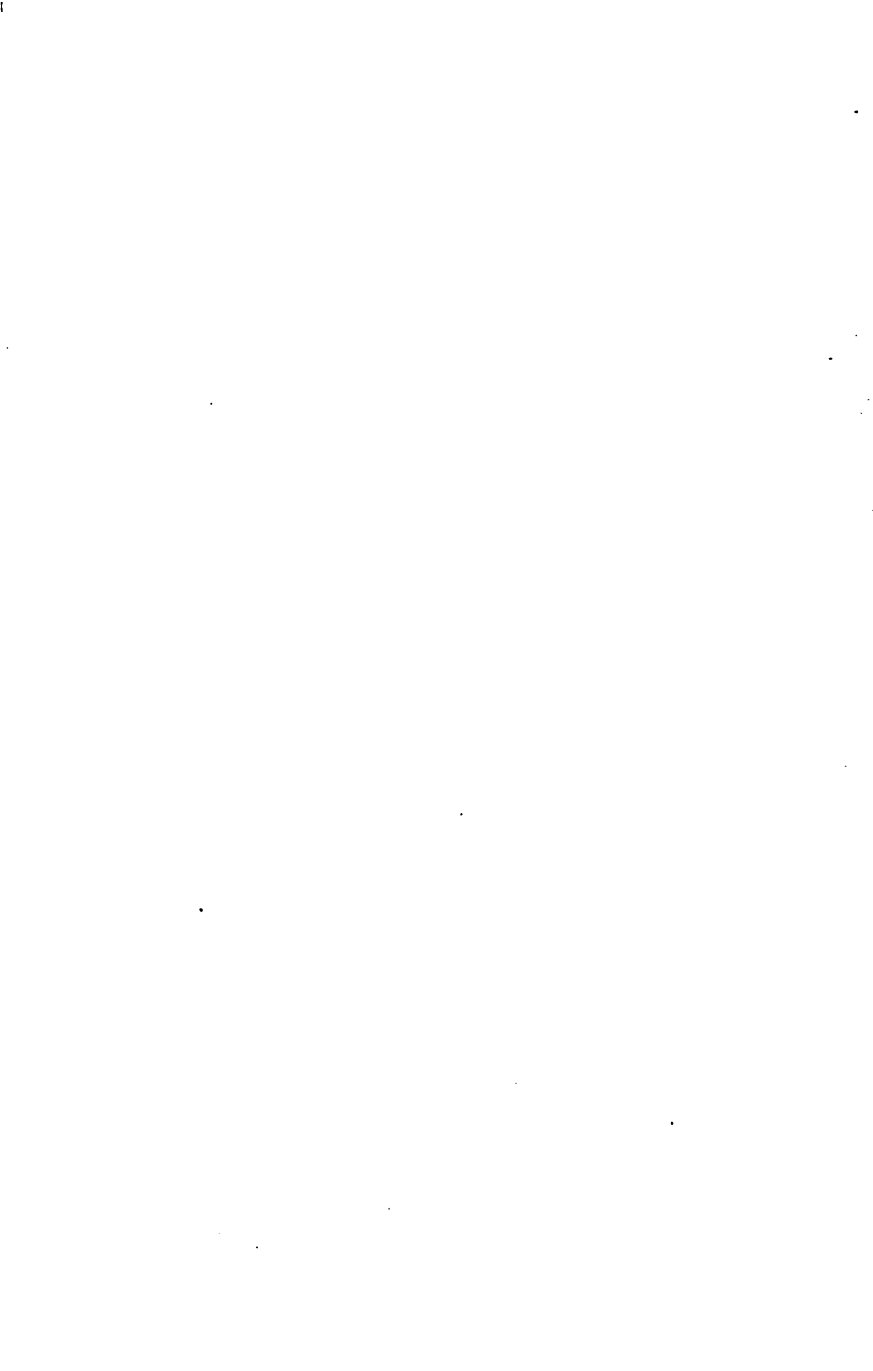
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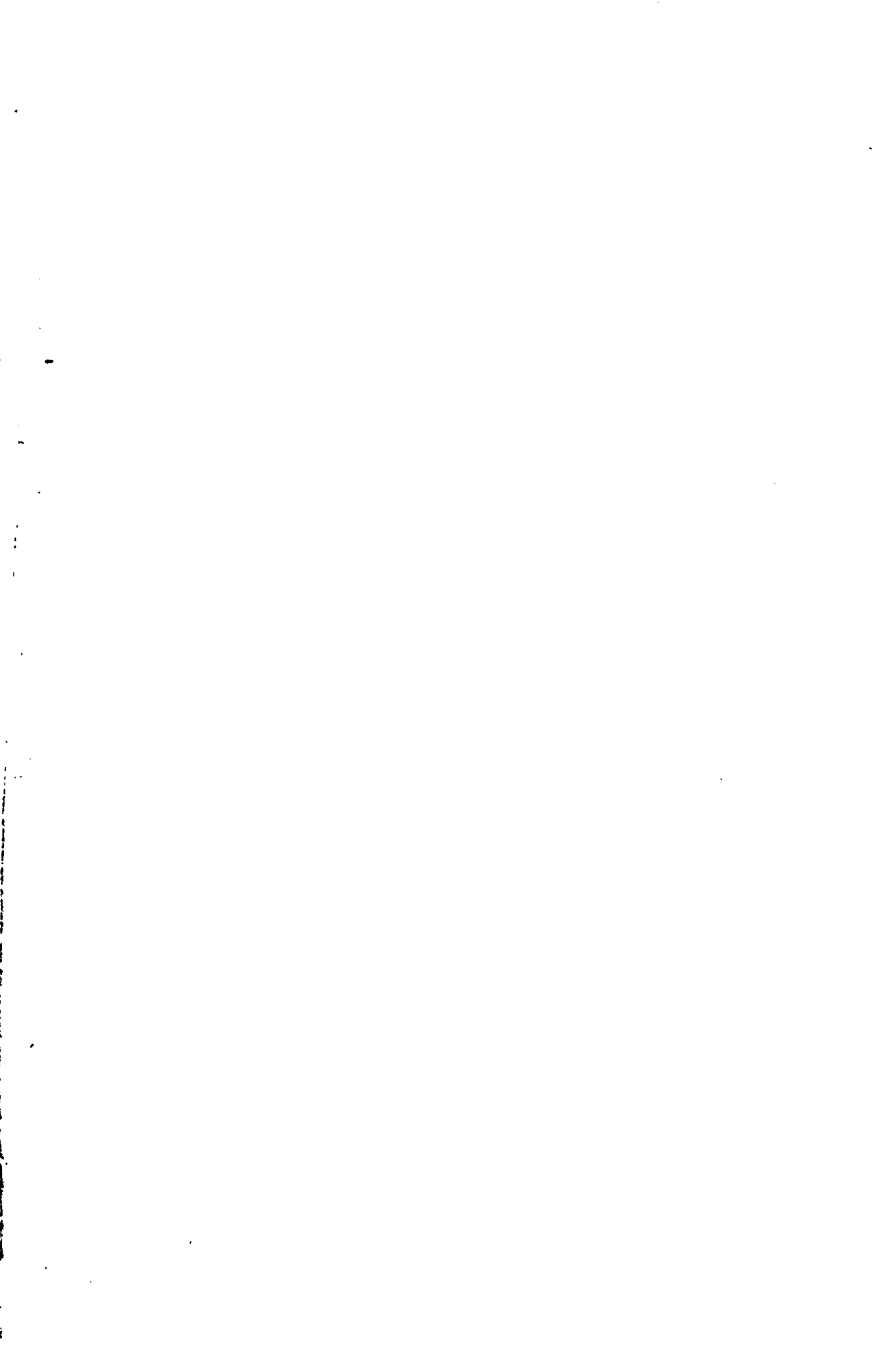
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